

**ANSI/ASHRAE/ICC/USGBC/IES Addendum ag to  
ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2020**

# Standard for the Design of High-Performance Green Buildings

Except Low-Rise  
Residential Buildings

*The Complete Technical Content of the International Green Construction Code®*

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## FOREWORD

Addendum ag updates lighting power densities (LPDs), based on a comprehensive review of all inputs, to more closely match and document the IES recommended practices for task and circulation illuminance values. The addendum updates the additional lighting power allowances to more closely reflect ornamental and display lighting efficacies. In Standard 90.1-1999, the ornamental and decorative additional lighting power allowance was 1 W/ft<sup>2</sup>. Since that time, LED decorative lighting efficacies have increased by at least five times. In Standard 189.1-2017, this additional lighting power allowance was reduced to 0.5 W/ft<sup>2</sup>. Addendum ag would reduce the decorative lighting power allowance to 0.40 W/ft<sup>2</sup> in spaces with more decorative lighting needs and to not more than 0.30 W/ft<sup>2</sup> for other spaces. The updates to the additional lighting power allowances also provide the opportunity to link specific control requirements to specific allowances, such as the requirements for daylight adaptation compensation controls for transition zones in parking garages and lobbies at facilities for the visually impaired. The separate “parking garage transition zone” category is removed so that the additional lighting power allowance is directly tied to daylight adaptation controls. This provides more flexibility for the designer in deciding whether to provide transition lighting with daylight adaptation controls.

Addendum ag also reorganizes the structure of the lighting requirements as follows:

- a. Dwelling unit lighting efficacy is moved from the prescriptive section to the end of the mandatory section, as dwelling-unit requirements are not tradable and are updated based on market information of residential lighting efficacies.
- a. Nomenclature of allowances and major heading levels is more closely aligned with Standard 90.1 so that additional lighting power allowances are at the same heading level as the LPDs. This moves many of the requirements up one level, making them easier to follow.

Additionally, the credit for institutional tuning (now called “high-end trim tuning”) is removed, as the credit for this control strategy is used to reclaim the additional efficiency points in Standard 90.1, Section 11, and it would be less confusing to have this credit in one place instead of two.

Standard 90.1-2022 added several space types to the Space-by-Space Method, and Addendum ag adds these space types as well for comparability and wide applicability of the lighting requirements.

Addendum ag also adds editorial changes to the cross-references to the lighting section of Standard 90.1 (Section 9) due to the restructuring of that section.

In a prior study for the updates to the 2022 Title 24 standards, the committee found that the lower LPDs were associated with lower first costs of the lighting system, especially for those designed to the wattage limits rather than considering the illumination needs for task, circulation, and surface brightness. Given that often there is a lower first cost and a lower operating cost, the changes have immediate payback and thus are cost effective.

In terms of enforceability, the enforcement structure (LPDs, additional lighting allowances, etc.) of the requirements have not changed. The primary changes have been the values of the LPD allowances, the size of the additional lighting power allowances, and some additional allowances.

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

## Addendum ag to Standard 189.1-2020

### **Modify Section 3.2 as shown.**

**astronomical time-switch control:** a control for lighting based on the time of day and astronomical events such as sunset and sunrise, accounting for geographic location and calendar date.

**daylight adaptation compensation:** a lighting control strategy that decreases the difference in illuminance levels between the outdoors and inside a building by reducing indoor illuminance levels at night and increasing illuminance levels during the day.

**facility for the visually impaired:** a facility that is designed to comply with the light levels specified in ANSI/IES RP-28 and is licensed or will be licensed by the *authority having jurisdiction* for senior long-term care, adult daycare, senior support or for people with special visual needs

**institutional tuning:** the process, by authorized personnel, of adjusting the maximum light output of individual luminaires, groups of luminaires, or entire lighting systems to support visual needs or to save energy. Institutional tuning is also known as “high-end trim control.”

**lamp:** a removable, electrically operated light source, which contains a base to provide an electrical connection between the *lamp* and *luminaire*. Note: LED light engines and LED retrofit kits are not considered *lamps* but are considered *luminaires*.

**lamp efficacy:** the ratio of the total luminous flux of a *lamp* to the total power input to the *lamp* at full light output and is typically expressed in lumens per Watt.

**lumen maintenance:** a lighting control strategy that increases light source power over time to maintain light levels as sources age, dirt accumulates in luminaires, or both. Also known as “lumen depreciation compensation” or “constant lumen output.”

**luminaire:** a complete lighting unit consisting of *lamp(s)* or other light sources together with the housing designed to distribute the light, position and protect the light sources, and connect the light sources to the power supply.

**luminaire efficacy:** the ratio of the total luminous flux of a *luminaire* to the total power input to the *luminaire* at full light output. *Luminaire* efficacy accounts for luminous efficacy of the light source, thermal management and optical efficiency and is typically expressed in lumens per Watt.

**multiscene lighting control:** a lighting control capable two or more predefined lighting settings, in addition to all-OFF, for two or more groups of luminaires to suit multiple activities in the space.

**parking garage daylight transition zone:** interior zone adjacent to covered vehicle entrances and exits from buildings and parking structures. The width of the *parking garage daylight transition zone* is not greater than 30 ft (9.1 m) to either side of the drive aisle centerline and not extended beyond adjacent walls. Where there is a control gate at the entrance or a straight run less than 160 feet (50 m) from the street into the parking garage entrance, the length of the *parking garage daylight transition zone* is not greater than 66 ft (20m) inside the structure. For all other entrance configurations, the length of the *parking garage daylight transition zone* is no greater than the length of a straight drive aisle immediately inside the entrance or exit and no greater than 160 ft (50 m).

**videoconferencing space:** a room or area with permanently installed videoconferencing cameras, audio equipment, and playback equipment for both audio-based and video-based two-way communication.

**Modify section 3.3 as shown.**

lm      lumens

[ . . . ]

W      watts

**Delete Section 7.3.4.3, Exception 3, as shown.**

**7.3.4.3 Lighting.** For *building projects* with interior lighting control systems controlled at a central point, such systems shall be programmed to allow automated DR. The programming shall reduce the total connected lighting power demand during a DR event by not less than 15% but no more than 50% of the baseline power level. The baseline lighting power shall be determined in accordance with Section 7.4.6.1.1. For *building projects* without central lighting controls, DR capabilities for lighting systems shall not be required.

For *spaces* not in the *daylight area* and not connected to automated daylighting control, the lighting levels shall be uniformly reduced throughout the *space*.

**Exception to 7.3.4.3:**

1. Luminaires or signage on emergency circuits.
2. Luminaires located within a *daylight area* that are dimmable and connected to automated daylighting control systems.
3. ~~Lighting systems, including dimming systems, claiming a lighting power allowance for institutional tuning in accordance with to Section 7.4.6.1.1(f).~~

**Relocate Section 7.4.6.2 to Section 7.3.6 as shown.**

**7.4.6.2-7.3.6 Dwelling-Unit Units Lighting Efficacy.** This section supersedes ANSI/ASHRAE/IES Standard 90.1, Section 9.4.3.1. Not less than 90% of the *permanently installed* lighting serving *dwelling units* shall be provided by *lamps with an* capable of operating at a *lamp efficacy* of not less than ~~75-85~~ lm/W or *luminaires with an* capable of operating at a *luminaire efficacy* of not less than ~~55-65~~ lm/W.

**Exception to 7.4.6.2-7.3.6:** Lighting attached to, or integral to, appliances.

**Revise Section 7.4.6. as shown, including renumbering and reorganization.**

**7.4.6 Lighting.** The lighting shall comply with ANSI/ASHRAE/IES Standard 90.1, Section 9, with the following modifications and additions.

**7.4.6.1 Interior Lighting Power Allowance**

**7.4.6.1.1 Interior Lighting Power Densities (LPDs).** The interior *lighting power allowance* shall be determined using ANSI/ASHRAE/IES Standard 90.1, ~~either~~ Section 9.5 ~~or~~ 9.6, with the following modifications:

- a. For those areas where the Building Area Method is used, the LPD from ANSI/ASHRAE/ IES Standard 90.1, Table 9.5.1, shall be replaced with the corresponding LPD in Table 7.4.6.1A.
- b. For those areas where the Space-by-Space Method is used, the LPD from ANSI/ASHRAE/ IES Standard 90.1, Tables 9.5.2.1-1 and 9.5.2.1-2 ~~9.6.1~~, shall be replaced with the corresponding LPD in Tables 7.4.6.1B and 7.4.6.1C.
- c. Room geometry adjustment when using the Space-by-Space Method: ANSI/ASHRAE/IES Standard 90.1, Section 9.5.2.4-6.4, shall be replaced with the following. For corridor/transition *spaces* less than 8 ft (2.4 m) wide, or 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 Tables 7.4.6.1B and 7.4.6.1C, the allowed LPD shall be 1.2 times the LPD in Tables 7.4.6.1B and 7.4.6.1C. RCR shall be calculated as described in ANSI/ASHRAE/IES Standard 90.1, Section ~~9.6.4~~ 9.5.2.4.
- d. Where the Space-by-Space Method is used, the additional increase in the interior lighting power allowed by ANSI/ASHRAE/IES Standard 90.1, Section 9.5.2.2, for specific lighting functions shall be replaced by the requirements and allowances of Section 7.4.6.1.1.
- e. Where the Building Area Method or Space-by-Space Method is used, the additional increase in the interior lighting power allowed by ANSI/ASHRAE/IES Standard 90.1, Section 9.5.2.3, for the use of non-mandatory controls shall be replaced by the requirements and allowances of Section 7.4.6.1.2.

~~4-7.4.6.1.1 Additional Interior Lighting Power.~~ Additional lighting power when using the Space-by-Space Method: For those areas where the Space-by-Space Method is used, the additional increase in the interior lighting power allowed by ANSI/ASHRAE/IES Standard 90.1, Section ~~9.6.2~~ 9.5.2.2, for specific lighting functions shall be replaced by the requirements and allowances of this section. Additional power shall be allowed only if the specified lighting is installed and automatically controlled separately from the *general lighting* and is designed and installed to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior *lighting power allowance* is permitted in the following cases and shall not be traded between different spaces:

- ~~1-a.~~ For *spaces* in which lighting is specified to be installed in addition to the *general lighting* for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall not ~~exceed 0.5~~ be greater than 0.40 W/ft<sup>2</sup> (4.3 W/m<sup>2</sup>) of such spaces. ~~in ballrooms, beauty and personal care service spaces, casinos, facilities for the visually impaired, leisure dining spaces, lobbies, performing art spaces, retail sales spaces, and religious worship spaces and not more than 0.30 W/ft<sup>2</sup> (3.2 W/m<sup>2</sup>) in other spaces.~~
- 2-b. For lighting equipment installed in sales areas and specifically designed and directed to highlight merchandise, calculate the additional lighting power shall not be greater than the allowance calculated as follows:

$$\begin{aligned} \text{Additional interior lighting power allowance} = \\ 750 \text{ W} + [\text{Retail Area 1} \times 0.40 \text{ W/ft}^2 (4.3 \text{ W/m}^2)] + [\text{Retail Area 2} \times 0.40 \text{ W/ft}^2 (4.3 \text{ W/m}^2)] \\ + [\text{Retail Area 3} \times 1.00 \text{ W/ft}^2 (10.8 \text{ W/m}^2)] \\ + [\text{Retail Area 4} \times 1.50 \text{ W/ft}^2 (16.1 \text{ W/m}^2)] \end{aligned}$$

where

Retail Area 1 = the floor area for all products not listed in Retail Areas 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 to 7.4.6.1.1(b)-(d)(2):** Other merchandise categories included in Retail Areas 2 through 4 where the documented need for additional lighting power based on visual inspection, contrast, or other critical display has been *approved*.

- c. For lighting in the parking garage daylight transition zone that is separately controlled by a daylight adaptation compensation control that automatically turns off the additional lighting power from sunset to sunrise, the allowed additional lighting power shall not be greater than  $0.90 \text{ W/ft}^2$  ( $9.7 \text{ W/m}^2$ ) times the area of parking garage daylight transition zone. Lighting power of each luminaire shall be automatically reduced by not less than 50% when there is no activity detected for 10 minutes in the surrounding zone, and lighting controlled together as a single control zone shall serve an area no greater than  $3,500 \text{ ft}^2$  ( $350 \text{ m}^2$ ).
- d. For transition lighting within 30 feet (9m) of an exit in *facilities for the visually impaired* that is separately controlled by a *daylight adaptation compensation control* that automatically turns off the additional lighting power from sunset to sunrise, and is not part of a daylight zone, the allowed additional lighting power shall not be greater than  $0.50 \text{ W/ft}^2$  ( $5.4 \text{ W/m}^2$ ) times the area within 30 feet (9 m) of the exit.
- e. In *videoconferencing spaces* where the lighting is designed in accordance with ANSI/IES/AVIXA RP-38 and all lighting in the space is controlled by a *multiscene lighting control*, the allowed additional lighting power shall not be greater than  $0.50 \text{ W/ft}^2$  ( $5.4 \text{ W/m}^2$ ) times the area of the videoconferencing portion of the *space*.

**7.4.6.1.2 Additional Lighting Power Allowance Where Nonmandatory Controls are Used.** Additional lighting power associated with using the nonmandatory controls specified by ~~e.~~ Any of the control factors from ANSI/ASHRAE/IES Standard 90.1, ~~Table Section 9.6.3-9.5.2.3~~, shall be permitted to be applied, provided that the corresponding control method is not required by ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1. This additional power shall be used only for the specified luminaires and shall not be traded between different spaces.

- f. ~~An additional lighting power allowance shall be credited for institutional tuning of dimmable lighting systems that meet all of the following requirements:~~
  1. ~~Institutional tuning controls shall be accessible only to authorized personnel.~~
  2. ~~Construction documents shall state that maximum light output or power of controlled lighting shall be reduced by at least 15% from full output.~~
  3. ~~The maximum light output or power of the controlled lighting shall be measured without institutional tuning and with institutional tuning to verify reduction of light output or power by at least 15% when tuned. In daylighted areas these measurements shall be conducted at night.~~

For controlled lighting in daylighted areas, the additional *lighting power allowance* shall be 0.05 times the controlled lighting power. In nondaylighted areas, the additional *lighting power allowance* shall be 0.10 times the controlled lighting power.

**Revise Table 7.4.6.1A as shown.**

**Table 7.4.6.1A Lighting Power Densities Using the Building Area Method**

<b>Building Area Type<sup>a</sup></b>	<b>LPD, W/ft<sup>2</sup></b>	<b>LPD, W/m<sup>2</sup></b>
Automotive facility	<del>0.64</del> <u>0.58</u>	<del>6.9</del> <u>6.3</u>
Convention center	0.51	5.5
Courthouse	<del>0.74</del> <u>0.64</u>	<del>8.0</del> <u>6.9</u>
Dining: Bar lounge/leisure	<del>0.69</del> <u>0.60</u>	<del>7.4</del> <u>6.4</u>
Dining: Cafeteria/fast food	<del>0.66</del> <u>0.59</u>	<del>7.1</del> <u>6.4</u>
Dining: Family	<del>0.64</del> <u>0.55</u>	<del>6.6</del> <u>6.0</u>
Dormitory	<del>0.48</del> <u>0.41</u>	<del>5.2</del> <u>4.4</u>
Exercise center	<del>0.64</del> <u>0.56</u>	<del>6.6</del> <u>6.1</u>
Fire station	<del>0.50</del> <u>0.47</u>	<del>5.4</del> <u>5.0</u>
Gymnasium	<del>0.67</del> <u>0.60</u>	<del>7.2</del> <u>6.5</u>
Health care clinic	<del>0.68</del> <u>0.63</u>	<del>7.3</del> <u>6.8</u>
Hospital	<del>0.86</del> <u>0.76</u>	<del>9.3</del> <u>8.2</u>
Hotel/Motel	<del>0.56</del> <u>0.40</u>	<del>6.0</del> <u>4.3</u>
Library	0.72	7.8
Manufacturing facility	0.60	6.5
Motion picture theater	<del>0.44</del> <u>0.38</u>	<del>4.7</del> <u>4.1</u>
Multifamily	<del>0.45</del> <u>0.41</u>	<del>4.8</del> <u>4.4</u>
Museum	<del>0.50</del> <u>0.48</u>	<del>5.4</del> <u>5.2</u>
Office	<del>0.60</del> <u>0.56</u>	<del>6.5</del> <u>6.1</u>
Parking garage	0.12	1.3
Penitentiary	<del>0.67</del> <u>0.56</u>	<del>7.2</del> <u>6.1</u>
Performing arts theater	<del>0.76</del> <u>0.64</u>	<del>8.2</del> <u>6.9</u>
Police station	<del>0.68</del> <u>0.54</u>	<del>7.3</del> <u>5.8</u>
Post office	<del>0.62</del> <u>0.55</u>	<del>6.7</del> <u>5.9</u>
Religious facility	<del>0.70</del> <u>0.62</u>	<del>7.5</del> <u>6.7</u>
Retail	<del>0.84</del> <u>0.75</u>	<del>9.0</del> <u>8.1</u>
School/university	<del>0.67</del> <u>0.55</u>	<del>7.2</del> <u>5.9</u>
Sports arena	<del>0.69</del> <u>0.61</u>	<del>7.4</del> <u>6.6</u>
Town hall	<del>0.63</del> <u>0.58</u>	<del>6.8</del> <u>6.2</u>
Transportation	0.45	4.9
Warehouse	0.41	4.4
Workshop	<del>0.83</del> <u>0.74</u>	<del>8.9</del> <u>7.9</u>

a. In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply

**Delete existing Table 7.4.6.1B (not shown) and replace with new Tables 7.4.6.1B and 7.4.6.1C.**

**Table 7.4.6.1B Lighting Power Density (LPD) Allowances and Room Cavity Ratio (RCR) Thresholds for Common Space Types Using the Space-by-Space Method**

**Informative Note:** This table covers common space types typically found in multiple building types. Table 7.4.6.1C covers building-specific space types typically found in a single building type.

<u>Common Space Types<sup>a</sup></u>	<u>LPD, W/ft<sup>2</sup></u>	<u>LPD, W/m<sup>2</sup></u>	<u>RCR Threshold</u>
<u>Atrium</u>			
<20 ft (6.1 m) in height	0.39	4.2	NA
≥20 ft (6.1m) and < 40 ft (12.2 m) in height	0.48	5.2	NA
>40 ft (12.2 m) in height	0.60	6.5	NA
<u>Audience Seating Area</u>			
<u>Auditorium</u>	0.44	4.7	6
<u>Convention center</u>	0.23	2.5	4
<u>Gymnasium</u>	0.23	2.5	6
<u>Motion picture theater</u>	0.30	3.2	4
<u>Performing arts theater</u>	0.75	8.1	8
<u>Religious building</u>	0.65	7.0	4
<u>Sports arena</u>	0.30	3.2	4
<u>All other audience seating areas</u>	0.23	2.5	4
<u>Banking Activity Area</u>	0.55	6.0	6
<u>Breakroom (See Lounge/Breakroom)</u>			
<u>Beauty and Personal Care Services</u>			
<u>Hair care/barber</u>	0.70	7.5	6
<u>Nail care</u>	0.70	7.5	6
<u>Massage</u>	0.70	7.5	8
<u>Classroom/Lecture Hall/Training Room</u>	0.60	6.5	4
<u>Conference/Meeting/Multipurpose Room</u>	0.88	9.5	6
<u>Copy/Print Room</u>	0.40	4.3	6
<u>Corridor<sup>b</sup></u>	0.37	4.0	width <8 ft (2.4 m)
<u>Courtroom</u>	0.90	9.7	6
<u>Computer Room</u>	0.40	4.3	4
<u>Dining Area</u>			
<u>Bar/lounge or leisure dining</u>	0.45	4.8	4
<u>Cafeteria or fast food dining</u>	0.40	4.3	4
<u>Family dining</u>	0.40	4.3	4
<u>All other dining areas</u>	0.39	4.2	4
<u>Electrical/Mechanical Room</u>	0.39	4.2	6
<u>Emergency Vehicle Garage</u>	0.47	5.1	4
<u>Equipment Control Room</u>	0.73	7.9	8

a. In cases where a space type appears in both Table 7.4.6.1B and Table 7.4.6.1C, the building-specific space type in Table 7.4.6.1C shall apply.

b. In corridors, the extra lighting power density allowance is permitted when the width of the corridor is less than 8 ft (2.4 m) and is not based on the RCR, see Section 7.4.6.1(c).

c. For lighting in daylight transition zone with an additional lighting power allowance <0.90 W/ft<sup>2</sup> (9.7 W/m<sup>2</sup>) times the area of parking garage daylight transition zone for lighting separately controlled by a daylight adaptation compensation control and occupant sensing control, see Section 7.4.6.1.1(c)

d. For accent lighting, see Section 7.4.6.1.1(b)

e. Class of play as defined by IES RP-6.



**Table 7.4.6.1B Lighting Power Density (LPD) Allowances and Room Cavity Ratio (RCR) Thresholds for Common Space Types Using the Space-by-Space Method**

**Informative Note:** This table covers common space types typically found in multiple building types. Table 7.4.6.1C covers building-specific space types typically found in a single building type.

<u>Common Space Types<sup>a</sup></u>	<u>LPD, W/ft<sup>2</sup></u>	<u>LPD, W/m<sup>2</sup></u>	<u>RCR Threshold</u>
<u>Food Preparation Area</u>	<u>0.92</u>	<u>9.9</u>	<u>6</u>
<u>Guest Room</u>	<u>0.35</u>	<u>3.8</u>	<u>6</u>
<u>Laboratory</u>			
<u>In or as a classroom</u>	<u>0.90</u>	<u>9.7</u>	<u>6</u>
<u>All other laboratories</u>	<u>0.90</u>	<u>9.7</u>	<u>6</u>
<u>Laundry/Washing Area</u>	<u>0.43</u>	<u>4.6</u>	<u>4</u>
<u>Loading Dock, Interior</u>	<u>0.51</u>	<u>5.5</u>	<u>6</u>
<u>Lobby</u>			
<u>Elevator</u>	<u>0.52</u>	<u>5.6</u>	<u>6</u>
<u>Hotel</u>	<u>0.46</u>	<u>5.0</u>	<u>4</u>
<u>Motion picture theater</u>	<u>0.30</u>	<u>3.2</u>	<u>4</u>
<u>Performing arts theater</u>	<u>0.80</u>	<u>8.6</u>	<u>6</u>
<u>All other lobbies</u>	<u>0.66</u>	<u>7.1</u>	<u>4</u>
<u>Locker Room</u>	<u>0.42</u>	<u>4.5</u>	<u>6</u>
<u>Lounge/Breakroom (including mother's room and wellness room)</u>	<u>0.44</u>	<u>4.7</u>	<u>4</u>
<u>Office</u>			
<u>Area ≤ 150 ft<sup>2</sup> (14 m<sup>2</sup>)</u>	<u>0.67</u>	<u>7.2</u>	<u>8</u>
<u>150 ft<sup>2</sup> (14 m<sup>2</sup>) &lt; Area &lt; 300 ft<sup>2</sup> (28 m<sup>2</sup>)</u>	<u>0.60</u>	<u>6.5</u>	<u>8</u>
<u>Area &gt; 300 ft<sup>2</sup> (28m<sup>2</sup>)</u>	<u>0.55</u>	<u>6.0</u>	<u>4</u>
<u>Parking Area, Interior<sup>c</sup></u>	<u>0.11</u>	<u>1.2</u>	<u>4</u>
<u>Pharmacy Area</u>	<u>1.00</u>	<u>10.8</u>	<u>6</u>
<u>Restroom</u>	<u>0.57</u>	<u>6.2</u>	<u>8</u>
<u>Sales Area<sup>d</sup></u>	<u>0.85</u>	<u>9.1</u>	<u>6</u>
<u>Seating Area, General</u>	<u>0.23</u>	<u>2.5</u>	<u>4</u>
<u>Stairway</u>	<u>The space containing the stairway shall determine the LPD requirements for the stairway</u>		
<u>Stairwell</u>	<u>0.45</u>	<u>4.8</u>	<u>10</u>
<u>Storage Room</u>			
<u>&lt;50 ft<sup>2</sup> (4.6 m<sup>2</sup>)</u>	<u>0.49</u>	<u>5.3</u>	<u>6</u>
<u>≥50 ft<sup>2</sup> (4.6 m<sup>2</sup>)</u>	<u>0.35</u>	<u>3.7</u>	<u>6</u>
<u>Vehicular Maintenance Area</u>	<u>0.53</u>	<u>5.7</u>	<u>4</u>
<u>Workshop</u>			
<u>Classroom workshop</u>	<u>1.00</u>	<u>10.8</u>	<u>6</u>
<u>All other workshop</u>	<u>1.00</u>	<u>10.8</u>	<u>6</u>

a. In cases where a space type appears in both Table 7.4.6.1B and Table 7.4.6.1C, the building-specific space type in Table 7.4.6.1C shall apply.

b. In corridors, the extra lighting power density allowance is permitted when the width of the corridor is less than 8 ft (2.4 m) and is not based on the RCR, see Section 7.4.6.1(c).

c. For lighting in daylight transition zone with an additional lighting power allowance ≤0.90 W/ft<sup>2</sup> (9.7 W/m<sup>2</sup>) times the area of parking garage daylight transition zone for lighting separately controlled by a daylight adaptation compensation control and occupant sensing control, see Section 7.4.6.1.1(c)

d. For accent lighting, see Section 7.4.6.1.1(b)

e. Class of play as defined by IES RP-6.

**Table 7.4.6.1C Lighting Power Density (LPD) Allowances and Room Cavity Ratio (RCR) Thresholds for Building-Specific Space Types Using the Space-by-Space Method**

<b>Building-Specific Space Types<sup>a</sup></b>	<b>LPD, W/ft<sup>2</sup></b>	<b>LPD, W/m<sup>2</sup></b>	<b>RCR Threshold</b>
<u>Automotive (See “Vehicular Maintenance Area” under common space types)</u>			
<u>Casino—Gaming Buildings</u>			
<u>Betting/sportsbook/keno/bingo area</u>	<u>0.60</u>	<u>6.5</u>	<u>7</u>
<u>High limit game area</u>	<u>0.80</u>	<u>8.6</u>	<u>4</u>
<u>Slot machine/digital gaming area</u>	<u>0.54</u>	<u>5.8</u>	<u>5</u>
<u>Table games area</u>	<u>0.60</u>	<u>6.5</u>	<u>5</u>
<u>Convention Center—Exhibit Space</u>	<u>0.55</u>	<u>6.0</u>	<u>4</u>
<u>Correctional Facilities (See “Prison/Penitentiary Buildings”)</u>			
<u>Dormitory—Living Quarters</u>	<u>00.35</u>	<u>3.8</u>	<u>8</u>
<u>Facility for the Visually Impaired<sup>b</sup></u>			
<u>Chapel (used primarily by residents)</u>	<u>0.70</u>	<u>7.5</u>	<u>4</u>
<u>Corridor<sup>c</sup></u>	<u>0.71</u>	<u>7.6</u>	<u>width &lt;8 ft (2.4 m)</u>
<u>Dining (and not used primarily by staff)</u>	<u>0.90</u>	<u>9.7</u>	<u>4</u>
<u>Lobby</u>	<u>0.85</u>	<u>9.1</u>	<u>4</u>
<u>Recreation room/common living room (and not used primarily by staff)</u>	<u>0.95</u>	<u>10.2</u>	<u>6</u>
<u>Restroom (and not used primarily by staff)</u>	<u>0.90</u>	<u>9.7</u>	<u>8</u>
<u>Fire Station—Sleeping Quarters</u>	<u>0.19</u>	<u>2.05</u>	<u>6</u>
<u>Gymnasium/Fitness Center</u>			
<u>Exercise area</u>	<u>0.50</u>	<u>5.4</u>	<u>4</u>
<u>Playing area</u>	<u>0.70</u>	<u>7.5</u>	<u>4</u>
<u>Health Care Facility</u>			
<u>Corridor<sup>c</sup></u>	<u>0.65</u>	<u>6.9</u>	<u>width &lt;8 ft (2.4 m)</u>
<u>Exam/treatment room</u>	<u>1.16</u>	<u>12.5</u>	<u>8</u>
<u>Imaging room</u>	<u>0.60</u>	<u>7.0</u>	<u>6</u>
<u>Lounge</u>	<u>0.44</u>	<u>4.7</u>	<u>6</u>
<u>Medical supply room</u>	<u>0.54</u>	<u>5.8</u>	<u>6</u>
<u>Nursery</u>	<u>0.80</u>	<u>8.6</u>	<u>6</u>
<u>Nurse’s station</u>	<u>0.75</u>	<u>8.1</u>	<u>6</u>
<u>Operating room</u>	<u>1.87</u>	<u>20.1</u>	<u>6</u>
<u>Patient room</u>	<u>0.70</u>	<u>7.5</u>	<u>6</u>
<u>Physical therapy room</u>	<u>0.75</u>	<u>8.1</u>	<u>6</u>
<u>Recovery room</u>	<u>0.89</u>	<u>9.6</u>	<u>6</u>
<u>Telemedicine</u>	<u>0.83</u>	<u>8.9</u>	<u>8</u>
<u>Library</u>			

a. In cases where a space type appears in both Table 7.4.6.1B and Table 7.4.6.1C, the building-specific space type in Table 7.4.6.1C shall apply.

b. For lighting within 30 ft (9 m) of an exit in facilities for the visually impaired that is separately controlled by a daylight adaptation compensation control, with an additional lighting power allowance  $\leq 0.50 \text{ W/ft}^2$  ( $5.4 \text{ W/m}^2$ ) times the area within 30 ft (9 m) of an exit, see Section 7.4.6.1.1(d).

c. In corridors, the extra lighting power density allowance is permitted when the width of the corridor is less than 8 ft (2.4 m) and is not based on the RCR, see Section 7.4.6.1(c).

d. Class of play as defined by IES RP-6.

**Table 7.4.6.1C Lighting Power Density (LPD) Allowances and Room Cavity Ratio (RCR) Thresholds for Building-Specific Space Types Using the Space-by-Space Method**

<b>Building-Specific Space Types<sup>a</sup></b>	<b>LPD, W/ft<sup>2</sup></b>	<b>LPD, W/m<sup>2</sup></b>	<b>RCR Threshold</b>
<u>Reading area</u>	<u>0.77</u>	<u>8.3</u>	4
<u>Stacks</u>	<u>1.08</u>	<u>11.6</u>	4
<b>Manufacturing Facility</b>			
<u>Corridor<sup>c</sup></u>	<u>0.28</u>	<u>3.0</u>	width <8 ft (2.4 m)
<u>Detailed manufacturing area</u>	<u>0.80</u>	<u>8.6</u>	4
<u>Equipment room</u>	<u>0.40</u>	<u>4.3</u>	6
<u>Extra high bay area (&gt;50 ft [15.2 m] floor-to-ceiling height)</u>	<u>0.73</u>	<u>7.9</u>	4
<u>High bay area (25 ft [7.6 m] to 50 ft [15.2 m] floor-to-ceiling height)</u>	<u>0.65</u>	<u>7.0</u>	4
<u>Low bay area (&lt;25 ft [7.6 m] floor-to-ceiling height)</u>	<u>0.61</u>	<u>6.6</u>	4
<b>Museum</b>			
<u>General exhibition area</u>	<u>0.31</u>	<u>3.3</u>	6
<u>Restoration room</u>	<u>0.70</u>	<u>7.5</u>	6
<u>Performing Arts Theater—Dressing Room</u>	<u>0.35</u>	<u>3.8</u>	6
<u>Post Office Sorting Area</u>	<u>0.50</u>	<u>5.4</u>	4
<b>Prison/Penitentiary Buildings</b>			
<u>Audience seating</u>	<u>0.50</u>	<u>5.4</u>	4
<u>Classroom/lecture hall/training room<sup>c</sup></u>	<u>0.65</u>	<u>7.0</u>	4
<u>Confinement cells</u>	<u>0.52</u>	<u>5.6</u>	6
<u>Dining area</u>	<u>0.42</u>	<u>4.5</u>	6
<b>Religious Buildings</b>			
<u>Audience seating area</u>	<u>0.65</u>	<u>7.0</u>	4
<u>Fellowship hall</u>	<u>0.48</u>	<u>5.2</u>	4
<u>Worship/pulpit/choir area</u>	<u>0.77</u>	<u>8.3</u>	4
<b>Retail Facilities</b>			
<u>Dressing/fitting room</u>	<u>0.49</u>	<u>5.3</u>	8
<u>Mall concourse</u>	<u>0.35</u>	<u>3.8</u>	4
<b>Sports Arena—Playing Area<sup>d</sup></b>			
<u>Class I facility</u>	<u>2.26</u>	<u>24.3</u>	4
<u>Class II facility</u>	<u>1.45</u>	<u>15.6</u>	4
<u>Class III facility</u>	<u>1.08</u>	<u>11.6</u>	4
<u>Class IV facility</u>	<u>0.72</u>	<u>7.8</u>	4
<b>Swimming Pools<sup>d</sup></b>			
<u>Class I facility</u>	<u>2.35</u>	<u>25.2</u>	4
<u>Class II facility</u>	<u>1.47</u>	<u>15.8</u>	4
<u>Class III facility</u>	<u>0.88</u>	<u>9.5</u>	4

a. In cases where a space type appears in both Table 7.4.6.1B and Table 7.4.6.1C, the building-specific space type in Table 7.4.6.1C shall apply.

b. For lighting within 30 ft (9 m) of an exit in facilities for the visually impaired that is separately controlled by a daylight adaptation compensation control, with an additional lighting power allowance  $\leq 0.50 \text{ W/ft}^2$  ( $5.4 \text{ W/m}^2$ ) times the area within 30 ft (9 m) of an exit, see Section 7.4.6.1.1(d).

c. In corridors, the extra lighting power density allowance is permitted when the width of the corridor is less than 8 ft (2.4 m) and is not based on the RCR, see Section 7.4.6.1(c).

d. Class of play as defined by IES RP-6.

**Table 7.4.6.1C Lighting Power Density (LPD) Allowances and Room Cavity Ratio (RCR) Thresholds for Building-Specific Space Types Using the Space-by-Space Method**

<b>Building-Specific Space Types<sup>a</sup></b>	<b>LPD, W/ft<sup>2</sup></b>	<b>LPD, W/m<sup>2</sup></b>	<b>RCR Threshold</b>
<u>Class IV facility</u>	<u>0.40</u>	<u>4.3</u>	<u>4</u>
<b>Transportation Facility</b>			
<u>Airport hangar</u>	<u>1.00</u>	<u>10.8</u>	<u>4</u>
<u>Baggage/carousel area</u>	<u>0.35</u>	<u>3.8</u>	<u>4</u>
<u>Airport concourse</u>	<u>0.32</u>	<u>3.4</u>	<u>4</u>
<u>Passenger loading area</u>	<u>0.32</u>	<u>3.4</u>	<u>4</u>
<u>Terminal ticket counter</u>	<u>0.40</u>	<u>4.3</u>	<u>4</u>
<b>Warehouse—Storage Buildings</b>			
<u>Warehouse and storage areas</u>	<u>0.27</u>	<u>2.9</u>	<u>4</u>
<u>Shipping and handling</u>	<u>0.60</u>	<u>6.5</u>	<u>6</u>

- a. In cases where a space type appears in both Table 7.4.6.1B and Table 7.4.6.1C, the building-specific space type in Table 7.4.6.1C shall apply.
- b. For lighting within 30 ft (9 m) of an exit in facilities for the visually impaired that is separately controlled by a daylight adaptation compensation control, with an additional lighting power allowance  $< 0.50 \text{ W/ft}^2$  ( $5.4 \text{ W/m}^2$ ) times the area within 30 ft (9 m) of an exit, see Section 7.4.6.1.1(d).
- c. In corridors, the extra lighting power density allowance is permitted when the width of the corridor is less than 8 ft (2.4 m) and is not based on the RCR, see Section 7.4.6.1(c).
- d. Class of play as defined by IES RP-6.

**Renumber Section 7.4.6.1.2 to be 7.4.6.2, and modify as shown.**

**7.4.6.2 7.4.6.1.2 Exterior Lighting Power Allowances LPDs.** The exterior lighting power allowance shall be determined using ANSI/ASHRAE/IES Standard 90.1, Section 9.4.3, with the following modification. The LPDs from ANSI/ASHRAE/IES Standard 90.1, Table 9.4.2-2, shall be multiplied by the appropriate LPD factor from Table 7.4.6.1.2. **7.4.6.2.**

**Renumber Table 7.4.6.1.2 to be 7.4.6.2, and modify as shown.**

**Table 7.4.6.1.2 7.4.6.2 Exterior Lighting Power Allowance Factors**

**Modify Section 7.4.6.3.3 as shown to align with office space size bins in Table 7.4.6.1B.**

**7.4.6.3.3 Occupancy Sensing Control in Large Office Spaces.** General lighting in office spaces greater than ~~250~~300 ft<sup>2</sup> (~~23~~28 m<sup>2</sup>) shall be controlled by occupancy sensing controls that comply with all of the following: [ . . . ]

**Modify Section 11 as shown.**

<b>Reference</b>	<b>Title</b>	<b>Section</b>
<b>Illuminating Engineering Society</b>		
<b>120 Wall Street, Floor 17</b>		
<b>New York, NY 10005-4001, United States</b>		
<b>1-212-248-5017, www.ies.org</b>		
<u>ANSI/IES RP-6-20</u>	<u>Recommended Practice: Lighting Sports and Recreational Areas</u>	<u>Table 7.4.6.1B.</u> <u>Table 7.4.6.1C</u>
<u>ANSI/IES RP-28-18</u>	<u>Recommended Practice: Lighting and the Visual Environment for Older Adults and the Visually Impaired</u>	<u>3.2, Table</u> <u>7.4.6.1B.</u> <u>Table 7.4.6.1C</u>
<u>ANSI/IES/AVIXA RP-38-17</u>	<u>Recommended Practice for Lighting Performance for Small to Medium Sized Videoconferencing Rooms</u>	<u>7.4.6.1.1(e)</u>

**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.

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Standard 189.1 serves as the complete technical content of the International Green Construction Code<sup>®</sup> (IgCC). The IgCC creates a regulatory framework for new and existing buildings, establishing minimum green requirements for buildings and complementing voluntary rating systems. For more information, visit [www.iccsafe.org](http://www.iccsafe.org).

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Founded in 1894, ASHRAE is a global professional society committed to serve humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration, and their allied fields.

As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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