

## SECTION 146 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

A building complies with this section if the actual lighting power density calculated under Subsection (a) is no greater than the allowed indoor lighting power calculated under Subsection (c).

- (a) **Calculation of Actual Indoor Lighting Power Density.** The actual indoor lighting power of the proposed building area is the total watts of all planned permanent and portable lighting systems; -subject to the following specific requirements and adjustments under Subsections 1 through 4.

**EXCEPTION to Section 146(a)** Up to 0.2 watts per square foot of portable lighting for office areas shall not be required to be included in the calculation of actual indoor lighting power density.

1. **Multiple interlocked lighting systems serving a space.** When multiple interlocked lighting systems serve an auditorium, convention center, conference room, multipurpose room, or theater, the watts of all systems except the system with the highest wattage may be excluded if the lighting systems are interlocked with a non-programmable double throw switch to prevent simultaneous operation.
2. **Reduction of wattage through controls.** The controlled watts of any luminaire may be reduced by the number of controlled watts times the applicable Power Adjustment Factor (PAF) from TABLE 146-C if:
  - A. The control complies with the applicable requirements of Section 119; and
  - B. At least 50 percent of the light output of the luminaire is within the applicable space listed in TABLE 146-C; and
  - C. Except as noted in TABLE 146-C, only one PAF is used for the luminaire; and
  - D. Multi-level occupant sensors used to qualify for the PAF in any space less than or equal to 250 square feet enclosed by floor-to-ceiling partitions, or any size classroom, corridor, conference or waiting room, shall meet the applicable requirements of Section 119. The multi-level occupancy sensor shall be installed to meet all the multi-level and uniformity requirements of Section 131(b) for the controlled lighting. The first stage shall activate between 30-70% of the lighting power in a room either through an automatic or manual action, and may be a switching or dimming system. After that event occurs any of the following actions shall be assigned to occur when manually called to do so by the occupant:
    - i. Activating the alternate set of lights.
    - ii. Activating 100% of the lighting power.
    - iii. Deactivating all lights.
  - E. For automatic daylighting control PAFs, the luminaire(s) shall be controlled by the automatic daylighting control(s) complying with applicable requirements of Section 119 and installed according to Section ~~131(e)4~~ 131(c)2D. The PAF's are calculated based on PAFs described below in Section 146(a)(2)(E)(i through iii), and at least 50 percent of the controlled luminaires shall be located within the daylight area. Daylight controls shall not control lamps that are outside of the daylight area (skylit, primary sidelit, and/or secondary sidelit daylight areas). The daylight area associated with the daylighting control receiving the PAF shall be shown on the building plans. PAFs shall not be available for automatic daylighting controls required by Section ~~131(e)(2 and 3)~~ 131(c)2(B and C).
    - i. **Power Adjustment Factor for controlling Primary Sidelit Daylight Areas:**

The PAF for the primary sidelit daylight area shall be used only if the daylighting control is separately controlling lighting within the primary sidelit daylight area. If lighting in the primary sidelit area is controlled together with lighting in the secondary sidelit area, the PAF for the secondary sidelit area in accordance with Section 146(a)(2)(E)(ii) shall be used. The PAF is a function of the effective aperture of the primary sidelit daylight area in accordance with Equation 146-A.

*EQUATION 146-A – EFFECTIVE APERTURE OF THE PRIMARY SIDELIT AREA*

$$\text{Primary Sidelit Effective Aperture} = \frac{\sum \text{Window Area} \times \text{VT}}{\text{Primary Sidelit Daylight Area}}$$

Where:

Window Area = rough opening of windows adjacent to the sidelit area, ft<sup>2</sup>

Window VT = visible light transmittance of window, no units

Primary Sidelit Daylight Area = see Section ~~104~~ [131\(c\)1](#) Daylight Area, Primary Sidelit

ii. **Power Adjustment Factor for controlling secondary sidelit areas:**

To qualify for the secondary sidelit daylight area PAF, the lighting in the secondary sidelit daylight area, or the lighting in the combined primary and secondary sidelit areas shall be controlled separately from lighting outside of these sidelit areas. The PAF is a function of the effective aperture of the secondary sidelit area in accordance with Equation 146-B.

*EQUATION 146-B – EFFECTIVE APERTURE OF THE SECONDARY SIDELIT AREA*

$$\text{Secondary Sidelit Effective Aperture} = \frac{\sum \text{Window Area} \times \text{VT}}{\text{Secondary Sidelit Daylight Area} + \text{Primary Sidelit Daylight Area}}$$

Where:

Window Area = rough opening of windows adjacent to the sidelit area, ft<sup>2</sup>

Window VT = visible light transmittance of window, no units

Primary Sidelit Daylight Area = see Section ~~104~~ [131\(c\)1](#) Daylight Area, Primary Sidelit

Secondary Sidelit Daylight Area = see Section ~~104~~ [131\(c\)1](#) Daylight Area, Secondary Sidelit.

iii. **Power Adjustment Factor for controlling skylit areas.**

The PAF is a function of the lighting power density of the general lighting in the space and the effective aperture of the skylights shall be determined in accordance with Equation 146-C.

*EQUATION 146-C – EFFECTIVE APERTURE OF SKYLIGHTS*

$$\text{Skylit Effective Aperture} = \frac{0.85 \times \sum \text{Skylight Area} \times \text{VT} \times \text{Well Efficiency}}{\text{Skylit Daylight Area}}$$

Where:

Skylight Area = the area of each individual skylight

Skylit Daylight Area = see [§Section ~~104~~ 131\(c\)1](#) Daylight Area, Skylit

VT = visible light transmittance. The VT shall include all skylighting system accessories including diffusers, louvers and other attachments that impact the diffusion of skylight into the space. The visible light transmittance of movable accessories shall be rated in the full open position. When the visible light transmittance of glazing and accessories are rated separately, the overall glazing transmittance is the product of the visible light transmittances of the glazings and accessories.

Well Efficiency = the ratio of the amount of visible light leaving a skylight well to the amount of visible light entering the skylight well. Well Efficiency shall be determined from Equation 146 F or Table

146B for specular and tubular light wells and from Table 146-A for all other light wells, based on the weighted average reflectance of the walls of the well and the geometry of the light well, or other test method approved by the Commission.

The well efficiency for non-specular or non-tubular light wells is based on the average weighted reflectance of the walls of the light well and the well cavity ratio. The well cavity ratio (WCR) is determined by the geometry of the skylight well and shall be determined using either Equation 146-D or Equation 146-E.

*EQUATION 146-D WELL CAVITY RATIO FOR RECTANGULAR WELLS*

$$WCR = \left( \frac{5 \times \text{well height} (\text{well length} + \text{well width})}{\text{well length} \times \text{well width}} \right); \text{ or}$$

*EQUATION 146-E WELL CAVITY RATIO FOR NON-RECTANGULAR-SHAPED WELLS:*

$$WCR = \left( \frac{2.5 \times \text{well height} \times \text{well perimeter}}{\text{well area}} \right)$$

Where the well perimeter and well area are measured at the bottom of the well.

*EQUATION 146-F WELL EFFICIENCY FOR SPECULAR TUBULAR LIGHT WELLS:*

$$WE_{Tube} = \rho \left( 2.2 * \frac{L}{D} \right)$$

Where:

$\rho$  = specular reflectance of interior light well wall

L/D = ratio of light well length to light well interior diameter

**F. PAFs shall not be available for demand responsive lighting controls required by Section 131(g).**

3. **Lighting wattage excluded.** The watts of the following lighting applications may be excluded from Section 146(c):
  - A. In theme parks: lighting for themes and special effects;
  - B. Studio lighting for film or photography provided that these lighting systems are separately switched from a general lighting system;
  - C. Lighting for dance floors, lighting for theatrical and other live performances, and theatrical lighting used for religious worship, provided that these lighting systems are additions to a general lighting system and are **separately** controlled by a multiscene or theatrical cross-fade control station accessible only to authorized operators;
  - D. In civic facilities, transportation facilities, convention centers, and hotel function areas: lighting for temporary exhibits, if the lighting is an addition to a general lighting system and is separately controlled from a panel accessible only to authorized operators;
  - E. Lighting installed by the manufacturer in refrigerated cases, walk-in freezers, vending machines, food preparation equipment, and scientific and industrial equipment;
  - F. In medical and clinical buildings: examination and surgical lights, low-ambient night-lights, and lighting integral to medical equipment, provided that these lighting systems are additions to and separately switched from a general lighting system;

- G. Lighting for plant growth or maintenance, if it ~~is~~ controlled by a multi-level astronomical time-switch control that complies with Section 119(h);
  - H. Lighting equipment that is for sale;
  - I. Lighting demonstration equipment in lighting education facilities;
  - J. Lighting that is required for exit signs subject to the CBC. Exit signs shall meet the requirements of the Appliance Efficiency Regulations;
  - K. Exitway or egress illumination that is normally off and that is subject to the CBC;
  - L. In hotel/motel buildings: lighting in guestrooms. ~~(L)ighting in hotel/motel guestrooms shall comply with Section 150(k)130(b);~~
  - M. In high-rise residential buildings: lighting in dwelling units. ~~(L)ighting in high-rise residential dwelling units shall comply with Section 150(k)130(b);~~
  - N. Temporary lighting systems;
  - O. Lighting in occupancy group U buildings less than 1000 square feet;
  - P. Lighting in unconditioned agricultural buildings less than 2500 square feet;
  - Q. Lighting systems in qualified historic buildings, as defined in the State Historic Building Code (Title 24, Part 8), are exempt from the lighting power allowances, if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems in qualified buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other lighting systems in qualified historic buildings shall comply with the lighting power allowances;
  - R. Lighting in parking garages for seven or less vehicles. Lighting in parking garages for seven or less vehicles shall comply with the applicable provisions of Section 150(k);
  - S. Lighting for signs. ~~(Signs shall comply with Section 148);~~
  - T. Lighting in a videoconferencing studio: Up to 2.5 watts per square foot of lighting in a videoconferencing studio, provided the videoconferencing lighting is in addition to and separately switched from a general lighting system, all of the lighting is controlled by a multiscene programmable control system, and the video conferencing studio has permanently installed videoconferencing cameras, audio equipment, and playback equipment;
  - U. Lighting for automatic teller machines that are located inside parking garages.
4. **Luminaire Power.** Luminaire power shall be determined in accordance with Section 130(d) or by a method approved by the Commission.

(b) **Indoor Lighting Power Trade-offs.** Indoor lighting power trade-offs shall be determined as follows:

1. Allowed lighting power determined according to the Complete Building Method may be traded only within a single building. Allowed lighting power shall not be traded between two or more buildings using the Complete Building Method. ~~provided that e~~Conditioned and unconditioned spaces shall be separate allotments, which shall be met separately without tradeoffs between the separate allotments.
2. Allowed lighting power determined according to the Area Category Method may be traded between the primary function areas using the Area Category Method. ~~provided that e~~Conditioned and unconditioned spaces shall be separate allotments, which shall be met separately without tradeoffs between the separate allotments.

**EXCEPTION to Section 146(b)2:-** ~~Allowed-Additional~~ lighting power allowed according to Table 146-F footnotes shall not be traded.

3. Allowed lighting power for wall display, floor display and ornamental/special effects lighting determined according to the Tailored Method shall be separate allotments without tradeoffs between the separate allotments. Allowed lighting power for general illumination determined according to the Tailored Method may be traded only within the primary function areas using the Tailored Method.

4. Allowed lighting power shall not be traded between the Complete Building Method, Area Category Method, or Tailored Method.

**EXCEPTION to Section 146(b)4:** Allowed lighting power may be traded from primary function areas using the Area Category Method to primary function areas using the Tailored Method.

5. Trading off lighting power allowances between indoor and outdoor areas shall not be permitted.

- (c) **Calculation of Allowed Indoor Lighting Power Density.** The allowed indoor lighting power density for each building type of use, or each primary function area, shall be calculated using one and only one of the methods in Subsection 1, 2, or 3, as applicable.

1. **Complete Building Method.** The Complete Building Method shall be used only on projects involving entire buildings with one type of use occupancy, ~~or~~ mixed occupancy buildings where one type of use occupancy makes up 90 percent of the entire building, or a tenant space where one type of use makes up 90 percent of the space. This approach shall only be used when the applicant is applying for a lighting permit and submits plans and specifications for the entire building or the entire tenant space. Under this approach, the allowed lighting power density is the lighting power density value in TABLE 146-E ~~times the floor area of the entire building.~~ Retail and wholesale stores, hotel/motel, and high-rise residential buildings shall not use this method.

**EXCEPTION to Section 146(c)1:** When using the Complete Building Method, if a Parking Garage and another Type of Use are part of a single building, the parking garage portion of the building and the remaining portion of the building shall each separately use the Complete Building Method Type of Use categories from Table 146-E.

2. **Area Category Method.** Under the Area Category Method, the total allowed lighting power for the building is the sum of all allowed lighting powers for all areas in the building. For purposes of the Area Category Method, an "area" shall be defined as all contiguous spaces which accommodate or are associated with a single one of the primary functions listed in TABLE 146-F. Where areas are bounded or separated by interior partitions, the floor space occupied by those interior partitions shall be included in any area. If at the time of permitting a tenant is not identified for a multi-tenant space, the tenant leased space allowance from TABLE 146-F shall be used. When the Area Category Method is used to calculate the allowed total lighting power for an entire building, main entry lobbies, corridors, restrooms, and support functions shall be treated as separate areas.
3. **Tailored Method.** The Tailored Method shall be used only on projects with primary function areas that do not use the Area Category Method.

Under the Tailored Method, the allowed indoor lighting power shall be calculated according to primary function type as permitted in column 1 of TABLE 146-G.

A. For all spaces, determine the general lighting allowance according to Section 146(c)3A.

- i. If a specific IESNA Illuminance Category is listed in Column 2 of TABLE 146-G, then such illuminance Category shall be used. Otherwise, determine the illuminance category for each lighting primary function type according to categories specified in the IESNA Lighting Handbook (IESNA HB), using the "Design Guide" for illuminance. Tasks that are performed less than two hours a day, or poor quality tasks that can be improved shall not be employed to justify use of Illuminance Categories E, F, or G.
- ii. Determine the area of each primary function ~~—~~.
- iii. Determine the room cavity ratio (RCR) for each primary function area ~~-~~. The RCR shall be calculated using either Equation 146-G or Equation 146-H.

*EQUATION 146-G ROOM CAVITY RATIO FOR RECTANGULAR ROOMS,*

$$\text{RCR} = \frac{5 \times H \times (L + W)}{L \times W}$$

EQUATION 146-H ROOM CAVITY RATIO FOR IRREGULAR-SHAPED ROOMS

$$RCR = \frac{2.5 \times H \times P}{A}$$

**WHERE:**

*L* = Length of room.

*W* = Width of room.

*H* = Vertical distance from the work plane to the centerline of the lighting fixture.

*P* = Perimeter of room.

*A* = Area of room.

- iv. Multiply the area of each primary function by the allowed lighting power density for the illuminance category and RCR for each primary function area according to TABLE 146-I. The product, or the actual installed lighting power for the primary function, whichever is less-

is the Allowed General Lighting Power for the Space.

- B. Determine additional allowed power for display and decorative lighting according to Sections 146(c)3B. Displays that are installed against a wall shall not qualify for the floor display lighting power allowances. Floor displays shall not qualify for the wall display allowances.

- i. Separate wall display lighting power is permitted if allowed by column 3 of TABLE 146-G. The allowed wall display lighting power is the smaller of:
  - a. The product of the room wall lengths and the listed allowed power density watts per linear foot (W/ft) in column 3 of TABLE 146-G, if applicable, or
  - b. The actual power of wall lighting systems.

The length of display walls shall include the length of the perimeter walls, including closable openings and permanent full height interior partitions. Permanent full height partitions are those which extend from the floor to within 2 feet of the ceiling or are taller than 10 feet, and are permanently anchored to the floor. Commercial and industrial storage stacks are not permanent full height partitions. For display lighting mounting height of ~~display~~ 11' 6" above the finished floor or higher, this amount may be increased by multiplying the product by the appropriate factor from TABLE 146-H. Qualifying wall lighting systems shall be mounted within ten feet of the wall and shall be of a lighting system type appropriate for wall lighting including a lighting track, wallwasher, valance, cove, or accent light including adjustable or fixed luminaires with PAR, R, MR, AR, or other projector lamp types.

- ii. Separate floor display lighting power is allowed if allowed by column 4 of TABLE 146-G. The allowed floor display lighting power is the smaller of:
  - a. The product of the area of the primary function and the allowed floor display lighting power density listed in column 4 of TABLE 146-G, if applicable, or
  - b. The actual power of floor display lighting systems.

For display lighting mounting height of ~~display lighting~~ 12' 11' 6" above finished floor or higher, this amount may be increased by multiplying the product by the appropriate factor from TABLE 146-H. Qualifying floor display lighting systems shall be mounted no closer than two feet to a wall and shall be a lighting system type such as track lighting, adjustable or fixed luminaires with PAR, R, MR, AR, or other projector lamp types or employing optics providing directional display light from non-directional lamps. Except for lighting that is external to display cases as defined below, lighting mounted inside of display cases shall also be considered floor display lighting.

- iii. Separate ornamental/special effects lighting power is permitted if allowed by column 5 of TABLE 146-G. If so, the allowed ornamental/special effects lighting power is the smaller of:

- a. The product of the area of the primary function and the allowed ornamental/special effects lighting power density specified in column 5 of TABLE 146-G, if applicable, or
- b. The actual power of allowed ornamental/special effects lighting luminaires.

Qualifying ornamental luminaires include chandeliers, sconces, lanterns, neon and cold cathode, light emitting diodes, theatrical projectors, moving lights, and light color panels when used in a decorative manner that does not serve as display lighting. Ornamental/special effects lighting shall not be the only light source in the space.

- iv. In retail merchandise sales, museum, and religious worship, the smallest of the following separate lighting power for display cases presenting very valuable ~~merchandise~~ display items is permitted:

- a. The product of the area of the primary function and ~~1.0~~ watt per square foot; or
- b. The product of the area of the display case and 16 watts per square foot, or
- c. The actual power of lighting for very valuable displays.

Qualifying lighting includes internal display case lighting or external lighting employing highly directional luminaires specifically designed to illuminate the case or inspection area without spill light. To qualify for this allowance, cases shall contain jewelry, coins, fine china or crystal, precious stones, silver, small art objects and artifacts, and/or valuable collections the selling display of which involves customer inspection of very fine detail from outside of a locked case.

- v. Only the general portion of the lighting power determined in Section 146(c)3A above shall be used for tradeoffs among the various occupancy or task types of the permitted space. The allowed wall display lighting power, the allowed floor display lighting power, the allowed ornamental/special effect lighting power, and the allowed lighting power for very valuable displays are “use it or lose it” power allowances that shall not be traded off.



TABLE 146-C LIGHTING POWER ADJUSTMENT FACTORS

TYPE OF CONTROL		TYPE OF SPACE	FACTOR			
Multi-level occupant sensor (see Note <u>1.2</u> ) combined with multi-level circuitry and switching in accordance with Section 146(a)(2)(D)		Any space ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, corridor, conference or waiting room.	0.20			
Multi-level occupant sensor (see Note <u>1.2</u> ) that reduces lighting power at least 50% when no persons are present. May be a switching or dimming (see Note <u>2.3</u> ) system.		Hallways of hotels/motels , multi-family, dormitory, and senior housing	<del>0.15</del> <u>0.25</u>			
		Commercial and Industrial Storage stack areas (max. 2 aisles per sensor)	0.15			
		Library Stacks (maximum 2 aisles per sensor)	<del>0.25</del> <u>0.15</u>			
Dimming system	Manual	Hotels/motels, restaurants, auditoriums, theaters	0.10			
	Multiscene programmable	Hotels/motels, restaurants, auditoriums, theaters	0.20			
<u>Demand responsive lighting control that reduces lighting power consumption in response to a demand response signal. (See Note 1)</u>		<u>All building types</u>	<u>0.05</u>			
<u>Manual dimming of dimmable electronic ballasts. (see Note 3)</u>		<u>All building types</u>	<u>0.10</u>			
Demand responsive lighting control that reduces lighting power consumption in response to a demand response signal when used in combination with manual dimming of dimmable electronic ballasts. (see Note <u>2.3</u> ).		All building types	0.15			
<del>Manual dimming of dimmable electronic ballasts (see Note 2)</del>		<del>All building types</del>	<del>0.10</del>			
Combined controls	Multi-level occupant sensor (see Note <u>1.2</u> ) combined with multi-level circuitry and switching in accordance with Section 146(a)(2)(D) combined with automatic multi-level daylighting controls	Any space ≤ 250 square feet within a daylit area and enclosed by floor-to-ceiling partitions, any size classroom, corridor, conference or waiting room. The PAF may be added to the daylighting control credit	0.10			
	Manual dimming of dimmable electronic ballasts (see Note <u>2.3</u> ) when used in combination with a multi-level occupant sensor combined with multi-level circuitry and switching in accordance with Section 146(a)(2)(D).	Any space ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, corridor, conference or waiting room	0.25			
Automatic multi-level daylighting controls (See Note 1)	Total primary sidelit daylight areas less than 2,500 ft <sup>2</sup> in an enclosed space and all secondary sidelit areas. (see Note <u>3.4</u> )	Effective Aperture				
		General Lighting Power Density (W/ft <sup>2</sup> )	>10% and ≤20%	>20% and ≤35%	>35% and ≤65%	> 65%
		All	0.12	0.20	0.25	0.30
	Total skylit daylight areas in an enclosed space less than 2,500 square feet, and where glazing material or diffuser has ASTM D1003 haze measurement greater than 90%	Effective Aperture				
		General Lighting Power Density (W/ft <sup>2</sup> )	0.6% ≤ EA < 1%	1% ≤ EA < 1.4%	1.4% ≤ EA < 1.8%	1.8% ≤ EA
		LPD < 0.7	0.24	0.30	0.32	0.34
		0.7 ≤ LPD < 1.0	0.18	0.26	0.30	0.32
		1.0 ≤ LPD < 1.4	0.12	0.22	0.26	0.28
1.4 ≤ LPD	0.08	0.20	0.24	0.28		
NOTES FOR TABLE 146-C:						
<u>1.</u> PAFs shall not be available for lighting controls required by Title 24, Part 6.						
<u>1.2.</u> To qualify for the PAF the multi-level occupant sensor shall comply with the applicable requirements of Section 119.						
<u>2.3.</u> To qualify for the PAF all dimming ballasts for T5 and T8 linear fluorescent lamps shall be electronic and shall be certified to the Energy Commission with a minimum RSE in accordance with Table 146-D.						
<u>3.4.</u> If the primary sidelit daylight area and the secondary sidelit daylight area are controlled together, the PAF is determined based on the secondary sidelit effective aperture for both the primary sidelit daylight area and the secondary sidelit daylight area.						

**TABLE 146-D RELATIVE SYSTEM EFFICIENCY (RSE) FOR DIMMABLE ELECTRONIC BALLASTS USED TO QUALIFY FOR POWER ADJUSTMENT FACTOR**

RSE is required only for dimmable electronic ballasts for T5 and T8 fluorescent lighting systems used to qualify for a PAF according to Note 2 for Table 146-C.

Lamp Category	Required Relative System Efficiency (RSE)			Corresponding Ballast Efficacy Factor (BEF) <sup>1</sup>			
	1 or 2 Lamps			1 x 28W Lamp	2 x 28W Lamps	1 x 54W HO Lamps	2 x 54W HO Lamps
T5	0.85			3.03	1.51	1.57	0.78
■							
Lamp Category	Required Relative System Efficiency (RSE)			Corresponding Ballast Efficacy Factor (BEF) <sup>1</sup>			
	1 Lamp	2 or 3 Lamps	4 Lamps	1 x 32W Lamps	2 x 32W Lamps	3 x 32W Lamps	4 x 32W Lamps
T8	0.86	0.90	0.98	2.69	1.4	0.93	0.76

<sup>1</sup> To calculate corresponding BEFs for lamp wattages and number of lamps not shown, use the following formula:

$$BEF = \left( \frac{RSE \times 100}{\# \text{ lamps} \times \text{lamp watts}} \right)$$

$$RSE = \left( \frac{\text{Ballast Factor}}{\text{Ballast Input Power} / \text{Total Rated Lamp Power}} \right)$$

NOTE: where Total Rated Lamp Power = number of Lamps per Ballast x Rated Lamp Power.

**TABLE 146-E COMPLETE BUILDING METHOD LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

TYPE OF USE	ALLOWED LIGHTING POWER
Auditoriums	1.5
Classroom Building	1.1
Commercial and industrial storage buildings	0.6
Convention centers	1.2
Financial institutions	1.1
General commercial and industrial work buildings	
High bay	1.0
Low bay	1.0
Grocery stores	1.5
Library	1.3
Medical buildings and clinics	1.1
Office buildings	0.85
Parking Garages	0.3
Religious facilities	1.6
Restaurants	1.2
Schools	1.0
Theaters	1.3
All others	0.6

TABLE 146-F AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)

PRIMARY FUNCTION	ALLOWED LIGHTING POWER (W/ft <sup>2</sup> )	PRIMARY FUNCTION	ALLOWED LIGHTING POWER (W/ft <sup>2</sup> )
Auditorium	1.5 <sup>1</sup>	Laboratory, Scientific	1.4 <sup>4</sup>
Auto Repair	0.9 <sup>2</sup>	Laundry	0.9
Beauty Salon	1.7	Library	Reading areas 1.2
Civic Meeting Place	1.3 <sup>1</sup>		Stacks 1.5
Classrooms, lecture, training, vocational room	1.2	Lobbies	Hotel lobby 1.1 <sup>1</sup>
Commercial and industrial storage (conditioned. & unconditioned.)	0.6		Main entry lobby 1.5 <sup>1</sup>
Commercial and industrial storage (refrigerated)	0.7	Locker/dressing room	0.8
Convention, conference, multipurpose and meeting centers	1.4 <sup>1</sup>	Lounge/recreation	1.1
Corridors, restrooms, stairs, and support areas	0.6	Malls and atria	1.2 <sup>1</sup>
Dining	1.1 <sup>1</sup>	Medical and clinical care	1.2
Electrical, mechanical, telephone rooms	0.7 <sup>2</sup>	Offices	> 250 square feet 0.9
Exercise center, gymnasium	1.0		≤ 250 square feet 1.1
Exhibit, museum	2.0	Parking garage	Parking Area 0.2
Financial transactions	1.2 <sup>1</sup>		Ramps and Entries 0.6
General commercial and industrial work	Low bay 1.0 <sup>2</sup>	Religious worship	1.5 <sup>1</sup>
	High bay 0.9 <sup>2</sup>	Retail merchandise sales, wholesale showrooms	1.6
	Precision 1.2 <sup>3</sup>	Tenant lease space	1.0
Grocery sales	1.6	Theaters	Motion picture 0.9 <sup>1</sup>
Hotel function area	1.5 <sup>1</sup>		Performance 1.4 <sup>1</sup>
Housing, Public and Commons Areas	Multi-family, Dormitory 1.0	Transportation Function	1.2
	Senior Housing 1.5	Waiting area	1.1 <sup>1</sup>
Kitchen, food preparation	1.6	All other	0.6

FOOTNOTES:

1. The smallest of the following values may be added to the allowed lighting power for ornamental chandeliers and sconces that are in addition to and switched or dimmed on circuits different from the circuits for general lighting:
  - a. One watt per square foot times the area of the task space that the chandelier or sconce is in; or
  - b. The actual design wattage of the chandelier or sconce.
2. The smallest of the following values may be added to the allowed lighting power for specialized task work
  - a. 0.5 watt per square foot times the area of the task space required for an art, craft assembly or manufacturing operation; ~~or~~
  - b. The actual design wattage of the luminaire(s) providing illuminance to the specialized task area.

For spaces employing this allowance, the plans shall clearly identify all task spaces using these tasks and the lighting equipment designed to illuminate these tasks. Tasks that are performed less than two hours per day or poor quality tasks that can be improved are not eligible for this specialized task work allowance.
3. The smallest of the following values may be added to the allowed power for precision commercial and industrial work:
  - a. One watt per square foot times the area of the task space required for the precision work; ~~or~~
  - b. The actual design wattage of the luminaire(s) providing the illuminance to the precision task area.

For spaces employing this allowance, the plans shall clearly identify all task spaces using these tasks and the lighting equipment designed to illuminate these tasks. Tasks that are performed less than two hours per day or poor quality tasks that can be improved are not eligible for this precision task work allowance.
4. The smallest of the following values may be added to the allowed lighting power for specialized task work:
  - a. 0.2 watt per square foot times the area of the task space required for a lab in a school; ~~or~~
  - b. The actual design wattage of the luminaire(s) providing illuminance to the specialized task area.

TABLE 146-G TAILORED METHOD SPECIAL LIGHTING POWER ALLOWANCES

1	2	3	4	5	
Primary Function	Illumination Category	Wall Display Power (W/ft)	Allowed Floor Display Power (W/ft <sup>2</sup> )	Allowed Ornamental/ Special Effect Lighting	
Auditorium	D	2.25	0.3	0.5	
Civic Meeting Place	D	3.15	0.2	0.5	
Commercial and industrial storage					
Inactive	B				
Active: bulky items; large labels	C				
Active: small items; small labels	D				
Convention, conference, multipurpose and meeting centers	D	2.5	0.4	0.5	
Correction Facility cells and day rooms	D	0	0	0	
Dining	B	1.5	0.6	0.6	
Dressing room	D	0	0	0	
Education facilities					
Classrooms, lecture, training, vocational room	D	5.5	0	0	
Science Labs	E	5.5	0	0	
Exercise center, gymnasium	IESNA HB	0	0	0	
Exhibit, museum	C	20.0	1.4	0.7	
Financial Transactions	D	3.15	0.2	0.6	
Food Service Facilities					
Butcher Shop, Food Display, Galley, Kitchen, Scullery	E	0	0	0	
All other	C	0	0	0	
Grocery store	D	9.9	1.1	0	
Housing, Public and Commons Areas					
Multi-family	D	0	0	0.9	
Dormitory, Senior Housing	D	0	0	0.9	
Hotel function area	D	2.25	0.2	0.5	
Laundry	D	0	0	0	
Library (Reading areas, Stacks ) <sup>1</sup>	D	0	0	0.6	
Lobbies:					
Hotel lobby	C	3.15 3.15	0.2	0.60	
Main entry lobby	C		0.2		
Locker <sup>1</sup>	C	0	0	0	
Lounge/recreation	C	7	0	0.7	
Malls and atria	D	3.5	0.5	0.6	
Medical and clinical care	IESNA HB	0	0	0	
Office					
Open office; Intensive VDT use	D				
Open office; Intermittent VDT use	E				
Private Office	E				

1	2	3	4	5	
Primary Function	Illumination Category	Wall Display Power (W/ft)	Allowed Floor Display Power (W/ft <sup>2</sup> )	Allowed Ornamental/Special Effect Lighting	
Police or fire stations	IESNA HB	0	0	0	
Religious worship	D	1.5	0.5	0.5	
Retail merchandise sales, wholesale showrooms	D	17.0	1.2	0.7	
Public rest areas along state and federal roadways	IESNA HB	0	0	0	
Stairways and corridors; toilets and washrooms	B				
Tenant lease space	C	0	0	0	
Transportation Function	D	3.15	0.3	0.6	
Theaters:					
Motion picture	C	3	0	0.6	
Performance	D	6	0	0.6	
Waiting area	C	3.15	0w 0.2	0.6	
All other not included above	IESNA HB	0	0	0	

<sup>1</sup> Library stacks and locker rooms may use a room cavity ratio (RCR) of > 7 in Table 146-I.

**TABLE 146-H ADJUSTMENTS FOR MOUNTING HEIGHT ABOVE FLOOR**

Height in feet above finished floor and bottom of luminaire(s)	Floor Display - Multiply by	Wall Display – Multiply by
11' 6" or less	1.0	1.0
>11' 6"	1.2 <del>1.2</del>	1.15
>16'	1.4	1.35
> 20'	2.0	1.75

**TABLE 146-I ILLUMINANCE CATEGORIES A THROUGH G LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

IESNA Illuminance Category	RCR<3.5	3.5<RCR<7.0	RCR>7.0
A	0.2	0.3	0.4
B	0.4	0.5	0.7
C	0.6	0.8	1.1
D	0.9	1.2	1.4
E	1.3	1.8	2.5
F	2.7	3.5	4.7
G	8.1	10.5	13.7

## SECTION 147 – REQUIREMENTS FOR OUTDOOR LIGHTING

This section applies to all outdoor lighting, whether attached to buildings, poles, structures or self supporting, including but not limited to, hardscape areas including parking lots, lighting for building entrances, sales and non-sales canopies; lighting for all outdoor sales areas; and lighting for building facades.

**EXCEPTIONS to Section 147:** When more than fifty percent of the light from a luminaire falls on one or more of the following applications, the lighting power for that luminaire shall be exempt from Section 147(b):

1. Temporary outdoor lighting.
  2. Lighting required and regulated by the Federal Aviation Administration, and the Coast Guard.
  3. Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way.
  4. Lighting for sports and athletic fields, and children’s playground.
  5. Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants, and aviation facilities.
  6. Lighting specifically for Automated Teller Machines as required by California Financial Code Section 13040, or required by law through a local ordinance.
  7. Lighting of public monuments.
  8. Signs. ~~(Signs shall meet the requirements of Section 148).~~
  9. Lighting used in or around swimming pools, water features, or other locations subject to Article 680 of the California Electrical Code.
  10. Lighting of tunnels, bridges, stairs, wheelchair elevator lifts for American with Disabilities Act (ADA) compliance, and ramps that are other than parking garage ramps.
  11. Landscape lighting.
  12. In theme parks: outdoor lighting for themes and special effects.
  13. Lighting for outdoor theatrical and other outdoor live performances, provided that these lighting systems are additions to area lighting systems and are controlled by a multiscene or theatrical cross-fade control station accessible only to authorized operators.
  14. Outdoor lighting systems for qualified historic buildings, as defined in the California Historic Building Code (Title 24, Part 8), if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems for qualified historic buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other outdoor lighting systems for qualified historic buildings shall comply with Section 147.
- (a) **Outdoor Lighting Power Trade-offs.** Outdoor lighting power trade-offs shall be determined as follows:
1. Allowed lighting power determined according to Section 147(d)1 for general hardscape lighting allowance may be traded to specific applications in Section 147(d)2, provided the hardscape area from which the lighting power is traded continues to be illuminated in accordance with Section 147(d)1~~(A)~~.
  2. Allowed lighting power determined according to Section 147(d)2 for additional lighting power allowances for specific applications shall not be traded between specific applications, or to hardscape lighting in Section 147(d)1.
  3. Allowed lighting power determined according to Section 147(d)3 for additional lighting power allowances for local ordinance shall not be traded to specific applications in Section 147(d)2 or to hardscape areas not covered by the local ordinance.
  4. Trading off lighting power allowances between outdoor and indoor areas shall not be permitted.

- (b) **Outdoor Lighting Power.** An outdoor lighting installation complies with this section if the actual outdoor lighting power installed is no greater than the allowed outdoor lighting power calculated under Subsection (d). The allowed outdoor lighting shall be calculated by Lighting Zone as defined in Section 10-114. Local governments may amend lighting zones in compliance with Section 10-114.
- (c) **Calculation of Actual Lighting Power.** The wattage of outdoor luminaires shall be determined in accordance with Section 130(d).
- (d) **Calculation of Allowed Lighting Power.** The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with Section 147(d)1, the sum of the additional lighting power allowance for specific applications determined in accordance with Section 147(d)2, and the sum of the additional lighting power allowances for local ordinance determined in accordance with Section 147(d)3.
1. **General Hardscape Lighting Allowance.** Determine the general hardscape lighting power allowances as follows:
    - A. The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s), and other improved area(s) that are illuminated. In plan view of the site, determine the illuminated hardscape area, which is defined as any hardscape area that is within a square pattern around each luminaire or pole that is ten times the luminaire mounting height with the luminaire in the middle of the pattern, less any areas that ~~is~~are within a building, beyond the hardscape area, beyond property lines, or obstructed by a structure. The illuminated hardscape area shall include portions of planters and landscaped areas that are within the lighting application and are less than or equal to ten feet wide in the short dimensions and are enclosed by hardscape or other improvement on at least three sides. Multiply the illuminated hardscape area by the Area Wattage Allowance (AWA) from Table 147-A for the appropriate Lighting Zone.
    - B. Determine the perimeter length of the general hardscape area. The total perimeter shall not include portions of hardscape that is not illuminated according to Section 147(d)1A. Multiply the hardscape perimeter by the Linear Wattage Allowance (LWA) for hardscape from Table 147-A for the appropriate lighting zone. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:
      - i. Landscaped areas completely enclosed within the hardscape area, and which have any dimensions width or length less than ten feet wide, shall not be added to the hardscape perimeter length.
      - ii. Landscaped areas completely enclosed within the hardscape area, and which all dimensions the width and length are a minimum of ten feet wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.
      - iii. Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.
    - C. Determine the Initial Wattage Allowance (IWA) for general hardscape lighting from Table 147-A for the appropriate lighting zone. The hardscape area shall be permitted one IWA per site.
    - D. The general hardscape lighting allowance shall be the sum of the allowed watts determined from (A), (B) and (C) above.
  2. **Additional Lighting Power Allowance for Specific Applications.** Additional lighting power for specific applications shall be the smaller of the additional lighting allowances for specific applications determined in accordance with Table 147-B for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.
  3. **Additional Lighting Power Allowance for Local Ordinance Requirements.** For hardscape areas, including parking lots, site roadways, driveways, sidewalks, walkways or bikeways, when specific light levels are required by law through a local ordinance, and provided the local ordinance meets Section 10-114, additional lighting power for those hardscape areas covered by the local ordinance requirement shall be the smaller of the additional lighting

allowances for local ordinance determined from Table 147-C for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.


**TABLE 147-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE**

Type of Power Allowance	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Area Wattage Allowance (AWA)	0.036 W/ft <sup>2</sup>	0.045 W/ft <sup>2</sup>	0.092 W/ft <sup>2</sup>	0.115 W/ft <sup>2</sup>
Linear Wattage Allowance (LWA)	0.36 W/lf	0.45 W/lf	0.92 W/lf	1.15 W/lf
Initial Wattage Allowance (IWA)	340 W	510 W	770 W	1030 W

**TABLE 147-B ADDITIONAL LIGHTING POWER ALLOWANCE FOR SPECIFIC APPLICATIONS**  
*All area and distance measurements in plan view unless otherwise noted.*

Lighting Application	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
<b>WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.</b>				
<b>Building Entrances or Exits.</b> Allowance per door. Luminaires qualifying for this allowance shall be within 20 feet of the door.	30 watts	75 watts	100 watts	120 watts
<b>Primary Entrances to Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities.</b> Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 feet of the primary entrance.	45 watts	80 watts	120 watts	130 watts
<b>Drive Up Windows.</b> Allowance per customer service location. Luminaires qualifying for this allowance shall be within 2 mounting heights of the sill of the window.	40 watts	75 <del>w</del> Watts	125 watts	200 watts
<b>Vehicle Service Station Uncovered Fuel Dispenser.</b> Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within 2 mounting heights of the dispenser.	120 watts	175 <del>w</del> Watts	185 watts	330 watts
<b>WATTAGE ALLOWANCE PER UNIT LENGTH (w/linear ft). May be used for one or two frontage side(s) per site.</b>				
<b>Outdoor Sales Frontage.</b> Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor sales area.	No Allowance	22.5 W/linear ft	36 W/linear ft	45 W/linear ft
<b>WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/ft2). May be used for any illuminated hardscape area on the site.</b>				
<b>Hardscape Ornamental Lighting.</b> Allowance for the total site illuminated hardscape area. Luminaires qualifying for this allowance shall be rated for 100 watts or less as determined in accordance with Section 130(d), and shall be post-top luminaires, lanterns, pendant luminaires, or chandeliers.	No Allowance	0.02 W/ft <sup>2</sup>	0.04 W/ft <sup>2</sup>	0.06 W/ft <sup>2</sup>

	Lighting Application	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
<b>WATTAGE ALLOWANCE PER SPECIFIC AREA (W/ft2). Use as appropriate provided that none of the following specific applications shall be used for the same area.</b>					
	<b>Building Facades.</b> Only areas of building façade that are illuminated shall qualify for this allowance. Luminaires qualifying for this allowance shall be aimed at the façade and shall be capable of illuminating it without obstruction or interference by permanent building features or other objects.	No Allowance	0.18 W/ft <sup>2</sup>	0.35 W/ft <sup>2</sup>	0.50 W/ft <sup>2</sup>
	<b>Outdoor Sales Lots.</b> Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other non sales areas shall be considered hardscape areas even if these areas are completely surrounded by sales lot on all sides. Luminaires qualifying for this allowance shall be within 5 mounting heights of the sales lot area.	0.164 W/ft <sup>2</sup>	0.555 W/ft <sup>2</sup>	0.758 W/ft <sup>2</sup>	1.285 W/ft <sup>2</sup>
	<b>Vehicle Service Station Hardscape.</b> Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property, or obstructed by signs or structures. Luminaires qualifying for this allowance shall be illuminating the hardscape area and shall not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure.	0.014 W/ft <sup>2</sup>	0.155 W/ft <sup>2</sup>	0.308 W/ft <sup>2</sup>	0.485 W/ft <sup>2</sup>
	<b>Vehicle Service Station Canopies</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.514 W/ft <sup>2</sup>	1.005 W/ft <sup>2</sup>	1.358 W/ft <sup>2</sup>	2.285 W/ft <sup>2</sup>
	<b>Sales Canopies</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	No Allowance	0.655 W/ft <sup>2</sup>	0.908 W/ft <sup>2</sup>	1.135 W/ft <sup>2</sup>
	<b>Non-sales Canopies.</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.084 W/ft <sup>2</sup>	0.205 W/ft <sup>2</sup>	0.408 W/ft <sup>2</sup>	0.585 W/ft <sup>2</sup>
	<b>Guard Stations.</b> Allowance up to 1,000 square feet per vehicle lane. Guard stations provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants, including identification, documentation, vehicle license plates, and vehicle contents. Qualifying luminaires shall be within 2 mounting heights of a vehicle lane or the guardhouse.	0.154 W/ft <sup>2</sup>	0.355 W/ft <sup>2</sup>	0.708 W/ft <sup>2</sup>	0.985 W/ft <sup>2</sup>
	<b>Student Pick-up/Drop-off zone.</b> Allowance for the area of the student pick-up/drop-off zone, with or without canopy, for preschool through 12th grade school campuses. A student pick-up/drop off zone is a curbside, controlled traffic area on a school campus where students are picked-up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 feet, times the smaller of the actual length or 250 feet. Qualifying luminaires shall be within 2 mounting heights of the student pick-up/drop-off zone.	No Allowance	0.12 W/ft <sup>2</sup>	0.45 W/ft <sup>2</sup>	No Allowance
	<b>Outdoor Dining.</b> Allowance for the total illuminated hardscape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.	0.014 W/ft <sup>2</sup>	0.135 W/ft <sup>2</sup>	0.258 W/ft <sup>2</sup>	0.435 W/ft <sup>2</sup>
	<b>Special Security Lighting for Retail Parking and Pedestrian Hardscape.</b> This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	0.007 W/ft <sup>2</sup>	0.009 W/ft <sup>2</sup>	0.019 W/ft <sup>2</sup>	No Allowance

TABLE 147- C ADDITIONAL LIGHTING POWER allowance FOR ORDINANCE REQUIREMENTS

ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft <sup>2</sup> ) WHEN AVERAGE LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, AVERAGE)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0	0	0	0
1.0	0.004	0	0	0
1.5	0.024	0.015	0	0
2.0	0.044	0.035	0	0
3.0	0.084	0.075	0.028	0.005
ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft <sup>2</sup> ) WHEN MINIMUM LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, MINIMUM)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0.004	0	0	0
1.0	0.044	0.035	0	0
1.5	0.124	0.115	0.068	0.045
2.0	0.164	0.155	0.108	0.085
3.0	0.164	0.155	0.108	0.085
4.0 or greater	0.164	0.155	0.108	0.085

**SECTION 148 – REQUIREMENTS FOR SIGNS**

This section applies to all internally illuminated and externally illuminated signs, unfiltered light emitting diodes (LEDs), and unfiltered neon, both indoor and outdoor. Each sign shall comply with either subsection (a) or (b), as applicable.

**(a) Maximum Allowed Lighting Power.**

1. For internally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 12 watts per square foot. For double-faced signs, only the area of a single face shall be used to determine the allowed lighting power.
2. For externally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 2.3 watts per square foot. Only areas of an externally lighted sign that are illuminated without obstruction or interference, by one or more luminaires, shall be used.

**(b) Alternate Lighting Sources.** The sign shall comply if it is equipped only with one or more of the following light sources:

1. High pressure sodium lamps; or
2. Metal halide lamps that are:
  - A. Pulse start or ceramic served by a ballast that has a minimum efficiency of 88% or greater, or
  - B. Pulse start that are 320 watts or smaller, are not 250 watt or 175 watt lamps, and are served by a ballast that has a minimum efficiency of 80%.

Where ballast efficiency is the measured output wattage to the lamp divided by the measured operating input wattage when tested according to ANSI C82.6-2005; or

3. Neon or cold cathode lamps with transformer or power supply efficiency greater than or equal to following:

- A. A minimum efficiency of 75% when the transformer or power supply rated output current is less than 50 mA; or
- B. A minimum efficiency of 68% when the transformer or power supply rated output current is 50 mA or greater.

Where the ratio of the output wattage to the input wattage is at 100% tubing load; or

- 4. Fluorescent lamps with a minimum color rendering index (CRI) of 80; or
- 5. Light emitting diodes (LEDs) with a power supply having an efficiency of 80% or greater; or

**EXCEPTION to Section 148(b)5:** Single voltage external power supplies that are designed to convert 120 volt AC input into lower voltage DC or AC output, and have a nameplate output power less than or equal to 250 watts, shall comply with the applicable requirements of the Appliance Efficiency Regulations (Title 20).

- 6. Compact fluorescent lamps that do not contain a medium screw base sockets (E24/E26); or
- 7. Electronic ballasts with a fundamental output frequency not less than 20 kHz.

**EXCEPTION 1 to Section 148:** Unfiltered incandescent lamps that are not part of an electronic message center (EMC), an internally illuminated sign, or an externally illuminated sign.

**EXCEPTION 2 to Section 148:** Exit signs. Exit signs shall meet the requirements of the Appliance Efficiency Regulations.

**EXCEPTION 3 to Section 148:** Traffic Signs. Traffic signs shall meet the requirements of the Appliance Efficiency Regulations.