Energy - Docket Optical System

From: rickmiller@rnm-eng.com
Sent: Thursday, January 08, 2015 1:34 PM
To: Energy - Docket Optical System
Cc: Lee, Simon@Energy
Subject: Docket #2014-BSTD-01 proposed revision to Title 24 Part 6 Sec 140.6
Attachments: Extract of Sec 140.6 with RNM comments 1.pdf

Attached in a marked up version of 2013 Title 24 Part 6 are my proposed revisions to Sec 140.6

I would like to emphasis that the **Lighting Power Density** (LPD) in W/SF are the values given in Tables 140.6-B, 140.6-C and 140.6-D, and that **Allowed Lighting Power** in watts is the calculated value derived from the LPD (in W/SF) times the applicable area (in SF).

Please acknowledge receipt of these comments.
Thank you,

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SECTION 140.5 – PRESCRIPTIVE REQUIREMENTS FOR SERVICE WATER HEATING SYSTEMS

(a) **Nonresidential Occupancies.** A service water heating system installed in a nonresidential building complies with this section if it complies with the applicable requirements of Sections 110.1, 110.3 and 120.3.

(b) **High-Rise Residential and Hotel/Motel Occupancies.** A service water heating system installed in a high-rise residential or hotel/motel building complies with this section if it meets the requirements of Section 150.1(c)8.

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

A building complies with this section if:

i. The Calculation of Actual Indoor Lighting Power ~~Density~~ of all proposed building areas combined, calculated under Subsection (a) is no greater than the ~~Density~~ Calculation of Allowed Indoor Lighting Power ~~Density~~, Specific Methodologies calculated under Subsection (c); and

ii. The Calculation of Allowed Indoor Lighting Power ~~Density~~, General Rules comply with Subsection (b); and

iii. General lighting complies with the Automatic Daylighting Controls in Secondary Daylit Zone requirements in Subsection (d).

(a) **Calculation of Actual Indoor Lighting Power ~~Density~~.** The actual indoor Lighting Power ~~Density~~ of all proposed building areas is the total watts of all planned permanent and portable lighting systems in all areas of the proposed building; subject to the applicable adjustments under Subdivisions 1 through 3 of this subsection and the requirements of Subdivision 4 of this subsection.

EXCEPTION to Section 140.6(a): Up to 0.3 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. **Two interlocked lighting systems**: No more than two lighting systems may be used for an area, and if there are two they must be interlocked. Where there are two interlocked lighting systems, the watts of the lower wattage system may be excluded from the actual indoor Lighting Power ~~Density~~ if:

   A. An Installation Certificate detailing compliance with Section 140.6(a)1 is submitted in accordance with Section 10-103 and Section 130.4; and

   B. The area or areas served by the interlocking systems is an auditorium, a convention center, a conference room, a multipurpose room, or a theater; and

   C. The two lighting systems are interlocked with a Nonprogrammable Double-Throw Switch to prevent simultaneous operation of both systems.

   For compliance with Part 6 a Nonprogrammable Double-Throw Switch is an electrical switch commonly called a "single pole double throw" or "three-way" switch that is wired as a selector switch allowing one of two loads to be enabled. It can be a line voltage switch or a low voltage switch selecting between two relays. It cannot be overridden or changed in any manner that would permit both loads to operate simultaneously.

2. **Reduction of wattage through controls.** In calculating actual indoor Lighting Power ~~Density~~, the installed watts of a luminaire providing general lighting in an area listed in TABLE 140.6-A may be reduced by the product of (i) the number of watts controlled as described in TABLE 140.6-A, times (ii) the applicable Power Adjustment Factor (PAF), if all of the following conditions are met:

   A. An Installation Certificate is submitted in accordance with Section 130.4(b); and

B. Luminaires and controls meet the applicable requirements of Section 110.9, and Sections 130.0 through 130.5; and

C. The controlled lighting is permanently installed general lighting systems and the controls are permanently installed nonresidential-rated lighting controls. (Thus, for example, portable lighting, portable lighting controls, and residential rated lighting controls shall not qualify for PAFs.)

When used for determining PAFs for general lighting in offices, furniture mounted luminaires that comply with all of the following conditions shall qualify as permanently installed general lighting systems:

i. The furniture mounted luminaires shall be permanently installed no later than the time of building permit inspection; and

ii. The furniture mounted luminaires shall be permanently hardwired; and

iii. The furniture mounted lighting system shall be designed to provide indirect general lighting; and

iv. Before multiplying the installed watts of the furniture mounted luminaire by the applicable PAF, 0.3 watts per square foot of the area illuminated by the furniture mounted luminaires shall be subtracted from installed watts of the furniture mounted luminaires; and

v. The lighting control for the furniture mounted luminaire complies with all other applicable requirements in Section 140.6(a)2.

D. At least 50 percent of the light output of the controlled luminaire is within the applicable area listed in TABLE 140.6-A. Luminaires on lighting tracks shall be within the applicable area in order to qualify for a PAF.

E. Only one PAF from TABLE 140.6-A may be used for each qualifying luminaire. PAFs shall not be added together unless allowed in TABLE 140.6-A.

F. Only lighting wattage directly controlled in accordance with Section 140.6(a)2 shall be used to reduce the calculated actual indoor Lighting Power Densities as allowed by Section 140.6(a)2. If only a portion of the wattage in a luminaire is controlled in accordance to Section 140.6(a)2, then only that portion of controlled wattage may be reduced in calculating actual indoor Lighting Power Density.

G. Lighting controls used to qualify for a PAF shall be designed and installed in addition to manual, multilevel, and automatic lighting controls required in Section 130.1, and in addition to any other lighting controls required by any provision of Part 6.

EXCEPTION to Section 140.6(a)2G: Lighting controls designed and installed for the sole purpose of compliance with Section 130.1(b)3 may be used to qualify for a PAF, provided the lighting controls are designed and installed in addition to all manual, and automatic lighting controls otherwise required in Section 130.1.

H. To qualify for the PAF for a Partial-ON Occupant Sensing Control in TABLE 140.6-A, a Partial-On Occupant Sensing Control shall meet all of the following requirements:

i. The control shall automatically deactivate all of the lighting power in the area within 30 minutes after the room has been vacated; and

ii. The first stage shall automatically activate between 30-70 percent of the lighting power in the area and may be a switching or dimming system; and

iii. The second stage shall require manual activation of the alternate set of lights, and this manual-ON requirements shall not be capable of conversion from manual-ON to automatic-ON functionality via manual switches or dip switches; and

iv. Switches shall be located in accordance with Section 130.1(a) and shall allow occupants to manually do all of the following regardless of the sensor status: activate the alternate set of lights in accordance with Item (iii); activate 100 percent of the lighting power; and deactivate all of the lights.

I. To qualify for the PAF for an occupant sensing control controlling the general lighting in large open plan office areas above workstations, in accordance with TABLE 140.6-A, the following requirements shall be met:

i. The open plan office area shall be greater than 250 square feet; and

ii. This PAF shall be available only in office areas which contain workstations; and

iii. Controlled luminaires shall only be those that provide general lighting directly above the controlled area, or furniture mounted luminaires that comply with Section 140.6(a)2 and provide general lighting directly above the controlled area; and

iv. Qualifying luminaires shall be controlled by occupant sensing controls that meet all of the following requirements, as applicable:

a. Infrared sensors shall be equipped by the manufacturer, of fitted in the field by the installer, with lenses or shrouds to prevent them from being triggered by movement outside of the controlled area.

b. Ultrasonic sensors shall be tuned to reduce their sensitivity to prevent them from being triggered by movements outside of the controlled area.

c. All other sensors shall be installed and adjusted as necessary to prevent them from being triggered by movements outside of the controlled area.

J. To qualify for the PAF for a Manual Dimming System PAF or a Multiscene Programmable Dimming System PAF in TABLE 140.6-A, the lighting shall be controlled with a control that can be manually operated by the user.

K. To qualify for the PAF for a Demand Responsive Control in TABLE 140.6-A, a Demand Responsive Control shall meet all of the following requirements:

i. The building shall be 10,000 square feet or smaller; and

ii. The controlled lighting shall be capable of being automatically reduced in response to a demand response signal; and

iii. Lighting shall be reduced in a manner consistent with uniform level of illumination requirements in TABLE 130.1-A; and

iv. Spaces that are non-habitable shall not be used to comply with this requirement, and spaces with a lighting power density of less than 0.5 watts per square foot shall not be counted toward the building's total lighting power.

L. To qualify for the PAF for Combined Manual Dimming plus Partial-ON Occupant Sensing Control in TABLE 140.6-A, (i) the lighting controls shall comply with the applicable requirements in Section 140.6(a)2J; and (ii) the lighting shall be controlled with a dimmer control that can be manually operated, or with a multi-scene programmable control that can be manually operated.

3. **Lighting wattage excluded.** The watts of the following indoor lighting applications may be excluded from actual indoor Lighting Power Density. (Indoor lighting not listed below shall comply with all applicable nonresidential indoor lighting requirements in Part 6.):

A. In theme parks: Lighting for themes and special effects.

B. Studio lighting for film or photography provided that these lighting systems are in addition to and 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 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 the applicable provisions of Section 110.9.

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 (lighting in hotel/motel guestrooms shall comply with Section 130.0(b). (Indoor lighting not in guestrooms shall comply with all applicable nonresidential lighting requirements in Part 6.)

M. In high-rise residential buildings: Lighting in dwelling units (Lighting in high-rise residential dwelling units shall comply with Section 130.0(b).) (Indoor lighting not in dwelling units shall comply with all applicable nonresidential lighting requirements in Part 6.)

N. Temporary lighting systems. (As defined in Section 100.1.)

O. Lighting in occupancy group U buildings less than 1,000 square feet.

P. Lighting in unconditioned agricultural buildings less than 2,500 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 Density 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 Density allowances.

R. Lighting in nonresidential parking garages for seven or less vehicles: Lighting in nonresidential parking garages for seven or less vehicles shall comply with the applicable residential parking garage provisions of Section 150.0(k).

S. Lighting for signs: Lighting for signs shall comply with Section 140.8.

T. Lighting for automatic teller machines that are located inside parking garages.

U. Lighting in refrigerated cases less than 3,000 square feet. (Lighting in refrigerated cases less than 3,000 square feet shall comply with the Title 20 Appliance Efficiency Regulations).

V. Lighting in elevators where the lighting meets the requirements of ASHRAE/IESNA Standard 90.1, 2010.

4. **Luminaire Classification and Power.** Luminaire Classification and Power shall be determined in accordance with Section 130.0(c).

(b) **Calculation of Allowed Indoor Lighting Power ~~Density~~: General Rules**

1. The allowed Indoor Lighting Power ~~Density~~ allotment for conditioned areas shall be calculated separately from the allowed Lighting Power ~~Density~~ allotment for unconditioned areas. Each allotment is applicable solely to the area to which it applies, and there shall be no trade-offs between conditioned and unconditioned area allotments.

2. Allowed Indoor Lighting Power ~~Density~~ allotment shall be calculated separately from the allowed Outdoor Lighting Power ~~Density~~ allotment. Each allotment is applicable solely to the area to which it applies, and there shall be no trade-offs between the separate Indoor and Outdoor allotments.

3. The Allowed Indoor Lighting Power ~~Density~~ allotment for general lighting shall be calculated as follows:

   A. The Complete Building Method, as described in Section 140.6(c)1, shall be used only for an entire building, except as permitted by Section 140.6(c)1. As described more fully in Section 140.6(c)1, and subject to the adjustments listed there, the Allowed Indoor Lighting Power ~~Density~~ allotment for general lighting for the entire building shall be calculated as follows:

      i. For a conditioned building, the product of the square feet of conditioned space of the building times the applicable allotment of watts per square foot described in TABLE 140.6-B.

      ii. For an unconditioned building, the product of the square foot of unconditioned space of the building times the applicable allotment of watts per square feet described in TABLE 140.6-B.

   B. The Area Category Method, as described in Section 140.6(c)2, shall be used either by itself for all areas in the building, or when some areas in the building use the Tailored Method described in Section 140.6(c)3. Under the Area Category Method (either by itself or in conjunction with the Tailored Method), as described more fully in Section 140.6(c)2, and subject to the adjustments listed there, the allowed Indoor Lighting Power ~~Density~~ allotment for general lighting shall be calculated for each area in the building as follows:

      i. For conditioned areas, by multiplying the conditioned square feet of the area times the applicable allotment of watts per square foot for the area shown in TABLE 140.6-C (or TABLE 140.6-D if the Tailored Method is used for that area).

      ii. For unconditioned areas, by multiplying the unconditioned square feet of the area times the applicable allotment of watts per square foot for the area shown in TABLE 140.6-C (or TABLE 140.6-D if the Tailored Method is used for that area).

      The Allowed Indoor Lighting Power ~~Density~~ allotment for general lighting for one area for which the Area Category Method was used may be increased up to the amount that the Allowed Indoor Lighting Power ~~Density~~ allotment for general lighting for another area using the Area Category Method or Tailored Method is decreased, except that such increases and decreases shall not be made between conditioned and unconditioned space.

   C. The Tailored Method, as described in Section 140.6(c)3, shall be used either by itself for all areas in the building, or when some areas in the building use the Area Category Method described in Section 140.6(c)2. Under the Tailored Method (either by itself or in conjunction with the Area Category Method) as described more fully in Section 140.6(c)3, and subject to the adjustments listed there, allowed Indoor Lighting Power ~~Density~~ allotment for general lighting shall be calculated for each area in the building as follows:

      i. For conditioned areas, by multiplying the conditioned square feet of the area times the applicable allotment of watts per square foot for the area shown in TABLE140.6-D (or TABLE140.6-C if the Area Category Method is used for that area);

      ii For unconditioned areas, by multiplying the unconditioned square feet of the area times the applicable allotment of watts per square foot for the area shown in TABLE140.6-D (or TABLE140.6-C if the Area Category Method is used for that area);

      The Allowed Indoor Lighting Power ~~Density~~ allotment for general lighting for one area for which the Tailored Method was used may be increased up to the amount that the Allowed Indoor Power Lighting ~~Density~~ for general lighting for another area is decreased, but only if the Tailored Method or Area Category Method was used for the other area, except that such increases and decreases shall not be made between conditioned and unconditioned space.

   D. If the Area Category Method is used for an area, the Tailored Method may not be used for that area. If the Tailored Method is used for an area, the Area Category Method may not be used for that area.

4. Allowed Indoor Lighting Power ~~Density~~ allotments for all lighting power allotments other than general lighting shall be restricted as follows:

   A. When using the Area Category Method, allowed Indoor Lighting Power allotments for specialized task work; ornamental; precision commercial and industrial work; white board or chalk board; accent, display and feature; decorative; or Videoconferencing Studio; may not be increased as a result of, or otherwise traded off against, decreasing any other allotment; and

B. When using the Tailored Method, allowed Indoor Lighting Power allotments for wall display; floor display and task; ornamental/special effect; or very valuable display case; may not be increased, or otherwise traded between any of the separate allotments.

(c) **Calculation of Allowed Indoor Lighting Power ~~Density~~: Specific Methodologies.** The allowed indoor Lighting Power ~~Density~~ for each building type, or each primary function area shall be calculated using only one of the methods in Subsection 1, 2 or 3 below as applicable.

1. **Complete Building Method.** Requirements for using the Complete Building Method include all of the following:

A. The Complete Building Method shall be used only for building types, as defined in Section 100.1, that are specifically listed in TABLE 140.6-B. (For example, retail and wholesale stores, hotel/motel, and high-rise residential buildings shall not use this method.)

B. The Complete Building Method shall be used only on projects involving:

i. Entire buildings with one type of use occupancy; or

EXCEPTION to Section 140.6(c)1Bi: If a parking garage plus another type of use listed in TABLE 140.6-B are part of a single building, the parking garage portion of the building and other type of use portion of the building shall each separately use the Complete Building Method.

ii. Mixed occupancy buildings where one type of use makes up at least 90 percent of the entire building (in which case, when applying the Complete Building Method, it shall be assumed that the primary use is 100 percent of the building); or

iii. A tenant space where one type of use makes up at least 90 percent of the entire tenant space (in which case, when applying the Complete Building Method, it shall be assumed that the primary use is 100 percent of the tenant space).

C. The Complete Building Method shall be used only when the applicant is applying for a lighting permit and submits plans and specifications for the entire building or the entire tenant space.

This is correct.

D. Under the Complete Building Method, the allowed indoor Lighting Power allotment is the Lighting Power Density value times the floor area of the entire building.

2. **Area Category Method.** Requirements for using the Area Category Method include all of the following:

A. The Area Category Method shall be used only for primary function areas, as defined in Section 100.1, that are listed in TABLE 140.6-C.

B. Primary Function Areas in TABLE 140.6-C shall not apply to a complete building. Each primary function area shall be determined as a separate area.

C. For purposes of compliance with Section 140.6(c)2, an "area" shall be defined as all contiguous areas that accommodate or are associated with a single primary function area listed in TABLE 146.0-C.

D. Where areas are bounded or separated by interior partitions, the floor area occupied by those interior partitions may be included in a Primary Function Area.

E. If at the time of permitting for a newly constructed building, a tenant is not identified for a multi-tenant area, a maximum of 0.6 watts per square foot shall be allowed for the lighting in each area in which a tenant has not been identified. The area shall be classified as Unleased Tenant Area.

This is correct.

F. Under the Area Category Method, the allowed indoor Lighting Power ~~Density~~ for each primary area is the Lighting Power Density value in TABLE 140.6-C times the square feet of the primary function. The total allowed indoor Lighting Power ~~Density~~ for the building is the sum of all allowed indoor Lighting Power ~~Densities~~ for all areas in the building.

G. In addition to the allowed indoor Lighting Power ~~Density~~ calculated according to Sections 140.6(c)2. A through F, the building may add additional lighting power allowances for specialized task work, ornamental, precision, accent, display, decorative, and white boards and chalk boards, in accordance with the footnotes in TABLE 140.6-C under the following conditions:

This is correct.

i. Only primary function areas having a footnote next to the allowed Lighting Power Density allotments in TABLE 140.6-C shall qualify for the added lighting power allowances in accordance with the correlated footnote listed at the bottom of the table; and

ii. The additional lighting power allowances shall be used only if the plans clearly identify all applicable task areas and the lighting equipment designed to illuminate these tasks; and

iii. Tasks that are performed less than two hours per day or poor quality tasks that can be improved are not eligible for the additional lighting power allowances; and

iv. The additional lighting power allowances shall not utilize any type of luminaires that are used for general lighting in the building; and

v. The additional lighting power allowances shall not be used when using the Complete Building Method, or when the Tailored Method is used for any area in the building; and

vi. The additional lighting power allowed is the smaller of lighting power listed in the applicable footnote in TABLE 140.6-C, or the actual design wattage; and

vii. In addition to all other additional lighting power allowed under Sections 140.6(c)2Gi through vi, up to 1.5 watts per square foot of additional lighting power shall be allowed in a videoconferencing studio, as defined in Section 100.1, provided the following conditions are met:

a. A completed and signed Installation Certificate is prepared and submitted in accordance with Section 130.4(b), specifically detailing compliance with the applicable requirements of Section 140.6(c)2Gvii; and

b. The Videoconferencing Studio is a room with permanently installed videoconferencing cameras, audio equipment, and playback equipment for both audio-based and video-based two-way communication between local and remote sites; and

c. General lighting is switched in accordance with TABLE 130.1-A; and

d. Wall wash lighting is separately switched from the general lighting system; and

e. All of the lighting in the studio, including general lighting and additional lighting power allowed by Section 140.6(c)2Gvii is controlled by a multiscene programmable control system (also known as a scene preset control system).

3. **Tailored Method.** Requirements for using the Tailored Method include all of the following:

A. The Tailored Method shall be used only for primary function areas listed in TABLE 140.6-D, as defined in Section 100.1, and for IES allowances listed in Section 140.6(c)3H.

B. Allowed Indoor Lighting Power Density allotments for general lighting shall be determined according to Section 140.6(c)3G or H, as applicable. General lighting shall not qualify for a mounting height multiplier.

C. For compliance with this Item, an "area" shall be defined as all contiguous areas which accommodate or are associated with a single primary function area listed in TABLE 140.6-D.

D. Where areas are bounded or separated by interior partitions, the floor area occupied by those interior partitions may be included in a Primary Function Area.

E. In addition to the allowed indoor Lighting Power Density allotments for general lighting calculated according to Sections 140.6(c)3G or H, as applicable, the building may add additional lighting power allowances for wall display, floor display and task lighting, ornamental/special effects, and very valuable display cases according to Section 140.6(c)3I through L.

F. The general lighting system shall not use narrow beam direction lamps, wall-washer, valance, direct cove, or perimeter linear slot types of lighting systems.

G. Determine allowed indoor Lighting Power Density allotments for general lighting for primary function areas listed in TABLE 140.6-D as follows:

i. Use the IES Illuminance values (Lux) listed in Column 2 to determine the Allowed General Lighting Power Density allotments for the area.

ii. Determine the room cavity ratio (RCR) for the area. The RCR shall be calculated according to the applicable equation in TABLE 140.6-F.

This is correct.

iii. Find the allowed Lighting Power Density allotments in TABLE 140.6-G that is applicable to the IES illuminance value (Lux) from Column 2 of Table 140.6-D (as described in Item i.) and the RCR determined in accordance with TABLE 140.6-F (as described in Item ii).

iv. Determine the square feet of the area in accordance with Section 140.6(c)3C and D.

This is correct.

v. Multiply the allowed Lighting Power Density allotment, as determined in accordance with Item iii by the square feet of each primary function area, as determined in accordance with Item iv. The product is the Allowed Indoor Lighting Power Density allotment for general lighting for the area.

H. Determine allowed indoor Lighting Power Density allotments for general lighting for only specific primary function areas NOT listed in TABLE 140.6-D as follows:

i. Use this Section only to calculate allowed indoor lighting power densities for general lighting in the following primary function areas. Do not use Section 140.6(c)3H for any primary function areas NOT listed below:

a. Exercise Center, Gymnasium

b. Medical and Clinical Care

c. Police Stations and Fire Stations

d. Public rest areas along state and federal roadways

e. Other primary function areas that are not listed in = TABLE140.6-D

ii. When calculating allowed indoor Lighting Power Density allotments for general lighting using Section 140.6(c)3H, the building shall not add additional lighting power allowances for any other use, including but not limited to wall display, floor display and task, ornamental/special effects, and very valuable display case lighting.

iii. Calculate the allowed indoor Lighting Power Density for each primary function area in the building as follows:

a. Determine the illuminance values (Lux) according to the Tenth Edition IES Lighting Handbook (IES HB), using the Recommended Horizontal Maintained Illuminance Targets for Observers 25-65 years old for illuminance.

b. Determine the room cavity ratio (RCR) for area. The RCR shall be calculated according to the applicable equation in TABLE 140.6-F.

This is correct.

c. Find the allowed lighting power density in TABLE 140.6-G that is applicable to the illuminance value (Lux) determined in accordance with Item (a) and the RCR determined in accordance with Item (b).

d. Determine the square feet of the area. For compliance with this item, an "area" shall be defined as all contiguous areas that accommodate or are associated with a single primary function area listed in Item (i). Where areas are bounded or separated by interior partitions, the floor area occupied by those interior partitions may be included in a Primary Function Area.

e. Multiply the square feet determined in accordance with Item (d), by the allowed lighting power density determined in accordance with item (c). The product is the Allowed Indoor Lighting Power Density allotment for general lighting for the area.

This is correct.

I. Determine additional allowed power for wall display lighting according to column 3 of Table 140.6-D for each primary function area as follows:

i. Additional wall display lighting power shall not be available when using Section 140.6(c)3H for determining the Allowed Indoor Lighting Power ~~Density~~ allotment for general lighting for the area.

ii. Floor displays shall not qualify for wall display allowances.

iii. Qualifying wall lighting shall:

a. Be mounted within 10 feet of the wall having the wall display. When track lighting is used for wall display, and where portions of that lighting track are more than 10 feet from the wall and other portions are within 10 feet of the wall, portions of track more than 10 feet from the wall shall not be used for the wall display allowance.

b. Be a lighting system type appropriate for wall lighting. Lighting systems appropriate for wall lighting are lighting track adjacent to the wall, wall-washer luminaires, luminaires behind a wall valance or wall cove, or accent light. (Accent luminaires are adjustable or fixed luminaires with PAR, R, MR, AR, or other directional lamp types.)

iv. Additional allowed power for wall display lighting is available only for lighting that illuminates walls having wall displays. The length of display walls shall include the length of the perimeter walls, including but not limited to closable openings and permanent full height interior partitions. Permanent full height interior partitions are those that (I) extend from the floor to no more than two feet of the ceiling or are taller than ten feet, and (II) are permanently anchored to the floor, provided, however, that neither commercial industrial stacks nor industrial storage stacks are permanent full height interior partitions.

v. The wall display mounting height multiplier is the applicable factor from TABLE 140.6-E. Mounting height is the distance from the finished floor to the bottom of the luminaire. Wall display lighting with varying mounting heights shall be separately determined under Item vi.

vi. The additional allowed power for wall display lighting shall be the smaller of:

a. The product of wall display power determined in accordance with TABLE 140.6-D, times the wall display lengths determined in accordance with Item iv, times the mounting height multiplier determined in accordance with Item v; or

b. The actual power used for the wall display lighting systems.

J. Determine additional allowed power for floor display lighting and task lighting as follows:

i. Neither additional allowed power for floor display lighting nor additional allowed power for task lighting shall be available when using Section 140.6(c)3H for determining allowed indoor Lighting Power ~~Density~~ allotment for general lighting.

ii. Displays that are installed against a wall shall not qualify for the floor display lighting power allowances.

iii. Lighting internal to display cases shall be counted as floor display lighting in accordance with Section 140.6(c)3J; or very valuable display case lighting in accordance with Section 140.6(c)3Liii and iv.

iv. Additional allowed power for floor display lighting, and additional allowed power for task lighting, may be used by qualifying floor display lighting systems, qualifying task lighting systems, or a combination of both. For floor areas qualifying for both floor display and task lighting power allowances, the additional allowed power shall be used only once for the same floor area, so that the allowance shall not be additive.

v. Qualifying floor display lighting shall:

a. Be mounted no closer than 2 feet to a wall.

b. Consist of only (I) directional lighting types, such as PAR, R, MR, AR; or (II) lighting employing optics providing directional display light from nondirectional lamps.

c. If track lighting is used, shall be only track heads that are classified as direction lighting types.

vi. Qualifying task lighting shall:

a. Be located immediately adjacent to and capable of illuminating the task for which it is installed.

b. Be of a type different from the general lighting system.

c. Be separately switched from the general lighting system.

vii. If there are illuminated floor displays, floor display lighting power shall be used only if allowed by column 4 of TABLE 140.6-D.

viii. Additional allowed power for a combination of floor display lighting and task lighting shall be available only for (I) floors having floor displays; or (II) floors not having floor displays but having tasks having illuminance recommendations that appear in the Tenth Edition of the IES Lighting Handbook and that are higher than the general lighting level in column 2 of TABLE 140.6-D. The square footage of floor display or the square footage of task areas shall be determined in accordance with Section 140.6(c)3C and D, except that any floor area designed to not have floor displays or tasks, such as floor areas designated as a path of egress, shall not be included for the floor display allowance.

ix. For floor display lighting where the bottom of the luminaire is 12 feet or higher above the finished floor, the wattage allowed in column 4 of TABLE 140.6-D may be increased by multiplying the floor display lighting power allowance by the appropriate factor from TABLE 140.6-E

Luminaire mounting height is the distance from the finished floor to the bottom of the luminaire. Wall display lighting with varying mounting heights shall be separately determined under Item x.

x. The additional allowed power for floor display lighting for each applicable area shall be the smaller of:

a. The product of allowed floor display and task lighting power determined in accordance with Section 140.6(c)3Jvii times the floor square footage determined in accordance with Section 140.6(c)3Jviii times the height multiplier if appropriate in accordance with Section 140.6(c)3Jix; or

b. The actual power used for the floor display lighting systems.

K. Determine additional allowed power for ornamental/special effects lighting as follows:

i. Additional allowed power for ornamental/special effects lighting shall not be available when using Section 140.6(c)3H for determining general Lighting Power Density allowances.

ii. Qualifying ornamental lighting includes luminaires such as chandeliers, sconces, lanterns, neon and cold cathode, light emitting diodes, theatrical projectors, moving lights and light color panels when any of those lights are used in a decorative manner that does not serve as display lighting or general lighting.

iii. Additional lighting power for ornamental/special effects lighting shall be used only if allowed by Column 5 of TABLE 140.6-D.

iv. Additional lighting power for ornamental/special effects lighting shall be used only in areas having ornamental/special effects lighting. The square footage of the floor area shall be determined in accordance with Section 140.6(c)3C and D, and it shall not include floor areas not having ornamental/special effects lighting.

v. The additional allowed power for ornamental/special effects lighting for each applicable area shall be the smaller of:

a. The product of the allowed ornamental/special effects lighting power determined in accordance with Section 140.6(c)3Kiii, times floor square footage determined in accordance with Section 140.6(c)3Kiv; or

b. The actual power of allowed ornamental/special effects lighting.

L. Determine additional allowed power for very valuable display case lighting as follows:

i. Additional allowed power for very valuable display case lighting shall not be available when using Section 140.6(c)3H for determining general Lighting Power Density allowances.

ii. Additional allowed power for very valuable display case lighting shall be available only for display cases in appropriate function areas in retail merchandise sales, museum and religious worship.

iii. To qualify for additional allowed power for very valuable display case lighting, a case shall contain jewelry, coins, fine china, fine crystal, precious stones, silver, small art objects and artifacts, and/or valuable collections the display of which involves customer inspection of very fine detail from outside of a locked case.

iv. 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, and shall not be fluorescent lighting unless installed inside of a display case.

v. If there is qualifying very valuable display case lighting, in accordance with Section 140.6(c)3Liii, the smallest of the following separate lighting power for display cases presenting very valuable display items is permitted:

a. The product of the area of the primary function and 0.8 watt per square foot; or

b. The product of the area of the display case and 12 watts per square foot; or

c. The actual power of lighting for very valuable displays.

(d) **Automatic Daylighting Controls in Secondary Daylit Zones.** All luminaires providing general lighting that is in, or partially in a Secondary Sidelit Daylit Zone as defined in Section 130.1(d)1C, and that is not in a Primary Sidelit Daylit Zone shall:

1. Be controlled independently from all other luminaires by automatic daylighting controls that meet the applicable requirements of Section 110.9; and

2. Be controlled in accordance with the applicable requirements in Section 130.1(d)2; and

3. All Secondary Sidelit Daylit Zones shall be shown on the plans submitted to the enforcing agency.

EXCEPTION 1 to Section 140.6(d): Luminaires in Secondary Sidelit Daylit Zone(s) in areas where the total wattage of general lighting is less than 120 Watts.

EXCEPTION 2 to Section 140.6(d): Luminaires in parking garages complying with Section 130.1(d)3.

TABLE 140.6-A LIGHTING POWER DENSITY ADJUSTMENT FACTORS (PAF)

TYPE OF CONTROL		TYPE OF AREA		FACTOR
a. To qualify for any of the Power Adjustment Factors in this table, the installation shall comply with the applicable requirements in Section 140.6(a)2 b. Only one PAF may be used for each qualifying luminaire unless combined below. c. Lighting controls that are required for compliance with Part 6 shall not be eligible for a PAF				
1. Partial-ON Occupant Sensing Control		Any area ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, conference or waiting room.		0.20
2. Occupant Sensing Controls in Large Open Plan Offices		In open plan offices > 250 square feet: One sensor controlling an area that is:	No larger than 125 square feet	0.40
			From 126 to 250 square feet	0.30
			From 251 to 500 square feet	0.20
3. Dimming System	Manual Dimming	Hotels/motels, restaurants, auditoriums, theaters		0.10
	Multiscene Programmable			0.20
4. Demand Responsive Control		All building types less than 10,000 square feet. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF		0.05
5. Combined Manual Dimming plus Partial-ON Occupant Sensing Control		Any area ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, conference or waiting room		0.25

This is correct.

TABLE 140.6-B COMPLETE BUILDING METHOD LIGHTING POWER DENSITY VALUES

This is correct.

TYPE OF BUILDING	ALLOWED LIGHTING POWER DENSITY (WATTS PER SQUARE FOOT)
Auditorium Building	1.5
Classroom Building	1.1
Commercial and Industrial Storage Building	0.6
Convention Center Building	1.2
Financial Institution Building	1.1
General Commercial Building/Industrial Work Building	1.0
Grocery Store Building	1.5
Library Building	1.3
Medical Building/Clinic Building	1.1
Office Building	0.8
Parking Garage Building	0.2
Religious Facility Building	1.6
Restaurant Building	1.2
School Building	1.0
Theater Building	1.3
All others buildings	0.6

Insert "DENSITY"

This is correct.

Insert "DENSITY"

TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT²)

PRIMARY FUNCTION AREA		ALLOWED LIGHTING POWER (W/ft²)		PRIMARY FUNCTION AREA		ALLOWED LIGHTING POWER (W/ft²)
Auditorium Area		1.5 [3]		Library Area	Reading areas	1.2 [3]
Auto Repair Area		0.9 [2]			Stack areas	1.5 [3]
Beauty Salon Area		1.7		Lobby Area	Hotel lobby	1.1 [3]
Civic Meeting Place Area		1.3 [3]			Main entry lobby	1.5 [3]
Classroom, Lecture, Training, Vocational Areas		1.2 [5]		Locker/Dressing Room		0.8
Commercial and Industrial Storage Areas (conditioned and unconditioned)		0.6		Lounge Area		1.1 [3]
Commercial and Industrial Storage Areas (refrigerated)		0.7		Malls and Atria		1.2 [3]
Convention, Conference, Multipurpose and Meeting Center Areas		1.4 [3]		Medical and Clinical Care Area		1.2
Corridor, Restroom, Stair, and Support Areas		0.6		Office Area	> 250 square feet	0.75
Dining Area		1.1 [3]			≤ 250 square feet	1.0
Electrical, Mechanical, Telephone Rooms		0.7 [2]		Parking Garage Area	Parking Area	0.14
Exercise Center, Gymnasium Areas		1.0			Dedicated Ramps	0.3
Exhibit, Museum Areas		2.0			Daylight Adaptation Zones [9]	0.6
Financial Transaction Area		1.2 [3]		Religious Worship Area		1.5 [3]
General Commercial and Industrial Work Areas	Low bay	0.9 [2]		Retail Merchandise Sales, Wholesale Showroom Areas		1.2 [6 and 7]
	High bay	1.0 [2]				
	Precision	1.2 [4]		Theater Area	Motion picture	0.9 [3]

Grocery Sales Area	1.2 [6 and 7]			Performance	1.4 [3]
Hotel Function Area	1.5 [3]		Transportation Function Area		1.2
Kitchen, Food Preparation Areas	1.6		Videoconferencing Studio		1.2 [8]
Laboratory Area, Scientific	1.4 [1]		Waiting Area		1.1 [3]
Laundry Area	0.9		All other areas		0.6

Footnotes for this table are listed below.

FOOTNOTES FOR TABLE 140.6-C:

See Section 140.6(c)2 for an explanation of additional lighting power available for specialized task work, ornamental, precision, accent, display, decorative, and white boards and chalk boards, in accordance with the footnotes in this table. The smallest of the added lighting power listed in each footnote below, or the actual design wattage, may be added to the allowed lighting power only when using the Area Category Method of compliance.

Footnote number	Type of lighting system allowed	~~Maximum allowed added lighting power~~. (W/ft^2 of task area unless otherwise noted)
1	Specialized task work	0.2 W/ft^2
2	Specialized task work	0.5 W/ft^2
3	Ornamental lighting as defined in Section 100.1 and in accordance with Section 140.6.(c)2.	0.5 W/ft^2
4	Precision commercial and industrial work	1.0 W/ft^2
5	Per linear foot of white board or chalk board.	5.5 W per linear foot
6	Accent, display and feature lighting - luminaires shall be adjustable or directional	0.3 W/ft^2
7	Decorative lighting - primary function shall be decorative and shall be in addition to general illumination.	0.2 W/ft^2
8	Additional Videoconferencing Studio lighting complying with all of the requirements in Section 140.6(c)2Gvii.	1.5 W/ft^2
9	Daylight Adaptation Zones shall be no longer than 66 feet from the entrance to the parking garage	

Change to "Additional Allowed Lighting Power Density"

Change to "Wall Display Lighting Power Density"

Change to "Allowed Combined Floor Display and Task Lighting Power Density"

Add "Power Density (W/sf)"

TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES

1	2	3	4	5
Primary Function Area	**General Illumination Level (Lux)**	**Wall Display Power (W/ft)**	**Allowed Combined Floor Display Power and Task Lighting Power (W/ft²)**	**Allowed Ornamental/ Special Effect Lighting**
Auditorium Area	300	2.25	0.3	0.5
Civic Meeting Place	300	3.15	0.2	0.5
Convention, Conference, Multipurpose, and Meeting Center Areas	300	2.50	0.4	0.5
Dining Areas	200	1.50	0.6	0.5
Exhibit, Museum Areas	150	15.0	1.2	0.5
Financial Transaction Area	300	3.15	0.2	0.5
Grocery Store Area	500	8.00	0.9	0.5
Hotel Function Area	400	2.25	0.2	0.5
Lobby Area:				
Hotel lobby	200	3.15	0.2	0.5
Main entry lobby	200	0	0.2	0
Lounge Area	200	7.00	0	0.5
Malls and Atria	300	3.50	0.5	0.5
Religious Worship Area	300	1.50	0.5	0.5
Retail Merchandise Sales, and Showroom Areas	400	14.00	1.0	0.5
Theater Area:				
Motion picture	200	3.00	0	0.5
Performance	200	6.00	0	0.5
Transportation Function Area	300	3.15	0.3	0.5
Waiting Area	300	3.15	0.2	0.5

TABLE 140.6-E ADJUSTMENTS FOR MOUNTING HEIGHT ABOVE FLOOR

Height in feet above finished floor and bottom of luminaire(s)	Floor Display or Wall Display – Multiply by
< 12'	1.00
12' to 16'	1.15
> 16’	1.30

TABLE 140.6-F ROOM CAVITY RATIO (RCR) EQUATIONS

Determine the Room Cavity Ratio for TABLE 140.6-G using one of the following equations.
Room cavity ratio for rectangular rooms $$RCR = \frac{5 \times H \times (L + W)}{L \times W}$$
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, and A = Area of room

TABLE 140.6-G ILLUMINANCE LEVEL (LUX) POWER DENSITY VALUES (WATTS/FT²)

Illuminance Level (Lux)	RCR ≤ 2.0	RCR > 2.0 and ≤ 3.5	RCR > 3.5 and ≤ 7.0	RCR > 7.0
50	0.2	0.3	0.4	0.6
100	0.4	0.6	0.8	1.2
200	0.6	0.8	1.3	1.9
300	0.8	1.0	1.4	2.0
400	0.9	1.1	1.5	2.2
500	1.0	1.2	1.6	2.4
600	1.2	1.4	2.0	2.9
700	1.4	1.7	2.3	3.3
800	1.6	1.9	2.6	3.8
900	1.8	2.2	3.0	4.3
1000	1.9	2.4	3.3	4.8