

Nonresidential Lighting Alterations

Draft Code Language

Last Updated: 3/21/2017

1. INTRODUCTION

The California Statewide Utility Codes and Standards Team actively supports the California Energy Commission in developing revisions to the 2019 California Building Energy Efficiency Standards (Title 24, Part 6). Our joint intent is to achieve significant energy savings through the development of reasonable, responsible, and cost-effective code change proposals for the 2019 Title 24 code change cycle.

The Statewide CASE Team may propose more changes once the model to assess the relative energy savings for three prescriptive options to comply with Title 24, Part 6 nonresidential lighting alteration code is refined.

In the meantime, the Statewide CASE Team proposes the following “code cleanup” changes:

- Restate the existing requirements more clearly, by organizing key information in two tables (conveying the requirements more clearly was identified by stakeholders as a critical need);
- Clarify that entire luminaire or component modification retrofit projects that increase lighting power have to meet all Lighting Power Density (LPD) and control requirements;
- Modify the exception for entire luminaire alterations from two or fewer luminaires in an enclosed space to one luminaire in an enclosed space (the exception was identified by the Energy Commission staff as an unintended loophole in the code); and
- Remove the exception for luminaire component modifications for two or fewer luminaires in an enclosed space (while keeping the <70 luminaires per floor per tenant per year exception).

The Statewide CASE Team would like to hear stakeholder feedback on the following ideas:

- Require Option 3 to be applied to the entire enclosed space to reduce the ability for partial retrofits in an enclosed space;
- Require partial OFF occupant sensing controls in stairwells under Option 3 (while keeping the exception for the requirement to have partial OFF occupant sensing controls in corridors).

The Statewide Utility Team is requesting feedback on the draft code language presented in this document. Input we receive will inform the code change proposal that the Statewide Utility Team will be proposing to the California Energy Commission in April 2017.

To provide feedback, please email us at info@title24stakeholders.com or contact the measure lead at:

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For more information about the California Statewide Utility Codes and Standards Team's 2019 Title 24, Part 6 advocacy efforts, and the latest information on this code change proposal please visit: www.title24stakeholders.com.

2. DRAFT CODE LANGUAGE

The proposed changes to the Standards, Reference Appendices, and the ACM Reference Manuals are provided below¹. Changes to the 2016 documents are marked with underlining (new language) and ~~strikethroughs~~ (deletions).

The proposed code changes are also color coded as follows:

- Closing unintended loopholes; and
- Adding stairwells as areas which could occupancy sensing as part of an alteration
- General cleanup of code related to alterations.

2.1 Standards

SECTION 130.1 – MANDATORY INDOOR LIGHTING CONTROLS

Nonresidential, high-rise residential and hotel/motel buildings shall comply with the applicable requirements of Sections 130.1(a) through 130.1(e)...

(c) Shut-OFF Controls

...

6. **Areas where full or partial OFF occupant sensing controls are required.** Lighting installed in the following areas shall meet the following requirements in addition to complying with Section 130.1(c)1.
 - A. In aisle ways and open areas in warehouses, lighting shall be controlled with occupant sensing controls that automatically reduce lighting power of each luminaire by at least 50 percent when the areas are unoccupied. The occupant sensing controls shall independently control lighting in each aisle way, and shall not control lighting beyond the aisle way being controlled by the sensor.

~~**EXCEPTION 1 to Section 130.1(c)6A:** In aisle ways and open areas in warehouses in which the installed lighting power is 80 percent or less of the value allowed under the Area Category Method, occupant sensing controls shall reduce lighting power by at least 40 percent.~~

~~**EXCEPTION 2 to Section 130.1(c)6A:** When metal halide lighting or high pressure sodium lighting is installed in warehouses, occupant sensing controls shall reduce lighting power by at least 40 percent.~~
 - B. In library book stack aisles 10 feet or longer that are accessible from only one end, and library book stack aisles 20 feet or longer that are accessible from both ends, lighting shall be controlled with occupant sensing controls that automatically reduce lighting power of each luminaire by at least 50 percent when the areas are unoccupied. The

¹ 2016 T-24 documents accessed in March 2017 as posted at: <http://www.energy.ca.gov/title24/2016standards/>

occupant sensing controls shall independently control lighting in each aisle way, and shall not control lighting beyond the aisle way being controlled by the sensor.

- C. Lighting installed in corridors and stairwells shall be controlled by occupant sensing controls that separately reduce the lighting power of each luminaire in each space by at least 50 percent when the space is unoccupied. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space, and shall be automatically activated when entered from all designed paths of egress.

- D. Lighting installed in stairwells shall be controlled by occupant sensing controls that separately reduce the lighting power of each luminaire in each space by at least 50 percent when the space is unoccupied. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space, and shall be automatically activated when entered from all designed paths of egress.

- 7. **Areas where partial OFF occupant sensing controls are required.** Lighting installed in the following areas shall meet the following requirements instead of complying with Section 130.1(c)1.

- A. Lighting in stairwells and common area corridors that provide access to guestrooms and dwelling units of high-rise residential buildings and hotel/motels shall be controlled with occupant sensing controls that automatically reduce lighting power of each luminaire by at least 50 percent when the areas are unoccupied. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space, and shall be automatically activated when entered from all designed paths of egress.

~~**EXCEPTION to Section 130.1(c)7A:** In corridors and stairwells in which the installed lighting power is 80 percent or less of the value allowed under the Area Category Method, occupant sensing controls shall reduce power by at least 40 percent.~~

- B. Lighting in stairwells that provide access to guestrooms and dwelling units of high-rise residential buildings and hotel/motels shall be controlled with occupant sensing controls that automatically reduce lighting power of each luminaire by at least 50 percent when the areas are unoccupied. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space, and shall be automatically activated when entered from all designed paths of egress.

~~B~~C. In parking garages...

SECTION 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL BUILDINGS, TO EXISTING OUTDOOR LIGHTING, AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS

Additions, alterations, and repairs to existing nonresidential, high-rise residential, and hotel/motel buildings, existing outdoor lighting for these occupancies, and internally and externally illuminated signs, shall meet the requirements specified in Sections 100.0 through 110.10, and 120.0 through 130.5 that are applicable to the building project, and either the performance compliance approach (energy budgets) in Section 141.0(a)2 (for additions) or 141.0(b)3 (for alterations), or the prescriptive compliance approach in Section 141.0(a)1 (for additions) or 141.0(b)2 (for alterations), for the Climate Zone in which the building is located. Climate zones are shown in FIGURE 100.1-A.

Covered process requirements for additions, alterations and repairs to existing nonresidential, high-rise residential, and hotel/motel buildings are specified in Section 141.1.

NOTE: For alterations that change the occupancy classification of the building, the requirements specified in Section 141.0(b) apply to the occupancy after the alterations.

(b) Alterations. Alterations to existing nonresidential, high-rise residential, or hotel/motel buildings, relocatable public school buildings or alterations in conjunction with a change in building occupancy to a nonresidential, high-rise residential, or hotel/motel occupancy are not subject to Subsection (a) and shall meet item 1, and either Item 2 or 3 below:

...

2. Prescriptive approach. The altered components of the envelope, or space conditioning, lighting, electrical power distribution and water heating systems, and any newly installed equipment serving the alteration, shall meet the applicable requirements of Sections 110.0 through 110.9, Sections 120.0 through 120.6, and Sections 120.9 through 130.5

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F. Spaces with lighting systems installed for the first time shall meet the requirements of Sections 110.9, 130.0, 130.1, 130.2, 130.4, 140.3(c), 140.6, and 140.7.

G. When the requirements of Section 130.1(d) are triggered by the addition of skylights to an existing building and the lighting system is not recircuited, the daylighting control need not meet the multi-level requirements in Section 130.1(d).

H. New internally and externally illuminated signs shall meet the requirements of Sections 110.9, 130.3 and 140.8.

I. Entire Luminaire Alterations. Alterations that do not increase lighting power in a space shall meet the applicable requirements in Table 141.0 E according to the criteria in Table 141.0-D. Any alteration that increases lighting power in an enclosed space shall meet the requirements of Sections 110.9, 130.0, 130.1, 130.4, and 140.6.

~~i. For each enclosed space, alterations that consist of either (a) removing and reinstalling a total of 40 percent or more of the existing luminaires; or (b) replacing or adding entire luminaires; or (c) adding, removing, or replacing walls or ceilings along with any redesign of the lighting system, shall meet the lighting power allowance in Section 140.6, and the altered luminaires shall meet the applicable requirements in Table 141.0 E; or~~

~~ii. For alterations where existing luminaires are replaced with new luminaires, and that do not include adding, removing, or replacing walls or ceilings along with redesign of the lighting system, the replacement luminaires in each office, retail, and hotel occupancy shall have at least 50 percent, and in all other occupancies at least 35 percent, lower rated power at full light output compared to the existing luminaires being replaced, and shall meet the requirements of Sections 130.1(a)1, 2, and 3, 130.1(c)1A through C, 130.1(c)2, 130.1(c)3, 130.1(c)4, 130.1(c)5, 130.1(c)6A, and for parking garages 130.1(c)7B.~~

EXCEPTION 1 to Section 141.0(b)2I. Alteration of portable luminaires, luminaires affixed to moveable partitions, or lighting excluded as specified in Section 140.6(a)3.

EXCEPTION 2 to Section 141.0(b)2I. In an enclosed space where two or fewer luminaires are one luminaire is replaced or reinstalled and is not increasing connected lighting power.

EXCEPTION 3 to Section 141.0(b)2I. In an enclosed space where less than 10 percent of existing luminaires are removed and reinstalled.

EXCEPTION 4 3 to Section 141.0(b)2I. Alterations **not increasing connected lighting power** that would directly cause the disturbance of asbestos, unless the alterations are made in conjunction with asbestos abatement.

EXCEPTION 5 4 to Section 141.0(b)2I. Acceptance testing requirements of Section 130.4 are not required for alterations where lighting controls are added to control 20 or fewer luminaires.

J. Luminaire Component Modifications. Luminaire component modifications in place without increasing the lighting power of the space shall meet the applicable requirements in Table 141.0 E according to the criteria in Table 141.0-D. Luminaire component modifications shall not prevent or disable the operation of any multi-level, shut-off, or daylighting controls. **Any luminaire component modification that increases lighting power in an enclosed space shall meet the requirements of Sections 110.9, 130.0, 130.1, 130.4, and 140.6,** that include replacing the ballasts or drivers and the associated lamps in the luminaire, permanently changing the light source of the luminaire, or changing the optical system of the luminaire, where 70 or more existing luminaires are modified either on any single floor of a building or, where multiple tenants inhabit the same floor, in any single tenant space, in any single year, shall not prevent or disable the operation of any multi-level, shut-off, or daylighting controls, and shall:

- i. — Meet the lighting power allowance in Section 140.6 and Comply with Table 141.0 E; or
- ii. — In office, retail, and hotel occupancies have at least 50 percent, and in all other occupancies have at least 35 percent, lower rated power at full light output as compared to the original luminaires prior to being modified, and meet the requirements of Sections 130.1(a)1, 2, and 3, 130.1(c)1A through C, 130.1(c)2, 130.1(c)3, 130.1(c)4, 130.1(c)5, 130.1(c)6A, and for parking garages 130.1(c)7B.

Lamp replacements alone and ballast replacements alone shall not be considered a modification of the luminaire provided that the replacement lamps or ballasts are installed and powered without modifying the luminaire.

EXCEPTION 1 to Section 141.0(b)2J. Modification of portable luminaires, luminaires affixed to moveable partitions, or lighting excluded by Section 140.6(a)3.

EXCEPTION 2 to Section 141.0(b)2J. In an enclosed space where two or fewer luminaires are modified.

EXCEPTION 2 3 to Section 141.0(b)2J. Modifications **not increasing connected lighting power** that would directly cause the disturbance of asbestos, unless the modifications are made in conjunction with asbestos abatement.

EXCEPTION 3 4 to Section 141.0(b)2J. Modifications not increasing lighting power where less than 70 existing luminaires are modified either on any single floor of a building or, where multiple tenants inhabit the same floor, in any single tenant space, in any single year.

EXCEPTION 4 to Section 141.0(b)2J. Acceptance testing requirements of Section 130.4 are not required for modifications where lighting controls are added to control 20 or fewer luminaires.

TABLE 141.0-D CRITERIA FOR SELECTING OPTION 1, 2 or 3 TO COMPLY WITH REQUIREMENTS FOR ENTIRE LUMINAIRE ALTERATION AND LUMINAIRE COMPONENT MODIFICATION

<u>Entire Luminaire Alterations (Section 141.0(b)2I)</u>	<u>Luminaire Component Modifications (Section 141.0(b)2J)</u>
<p>For each enclosed space:</p> <p>Use Option 1, 2, or 3 in Table 141.0-E to comply IF:</p> <p>A. <u>Replacing luminaires as entire luminaires (one-for-one luminaire replacement) without adding, removing, or replacing walls or ceilings.</u></p> <p>For each enclosed space:</p> <p>Use Option 1 or 2 in Table 141.0-E to comply IF:</p> <p>B. <u>Adding entire luminaire(s); OR</u> C. <u>Replacing luminaires; OR</u> D. <u>Removing and reinstalling existing luminaires.</u></p>	<p>Use Option 1, 2, or 3 in Table 141.0-E to comply IF</p> <ul style="list-style-type: none"> • <u>Replacing ballasts or drivers AND the associated lamps, permanently changing the light source, or the optical system.</u> <p><u>NOTE: Lamp replacements alone and ballast replacements alone shall not be considered a modification of the luminaire provided that the replacement lamps or ballasts are installed and powered without modifying the luminaire.</u></p>

TABLE 141.0-E CONTROL REQUIREMENTS FOR ENTIRE LUMINAIRE ALTERATIONS AND LUMINAIRE COMPONENT MODIFICATIONS

<u>Requirements that shall be met for Entire Luminaire Alterations and Luminaire Component Modifications for each enclosed space</u>	<u>Option 1</u>	<u>Option 2</u>	<u>Option 3</u> <u>(Not available for Entire Luminaire Alterations Criteria B, C or D)</u>
<u>Resulting lighting power density (LPD), compared to the lighting power allowance specified in Section 140.6(c)2, Area Category Method</u>	<u>> 85 to 100% of LPD allowance</u>	<u>≤ 85% of LPD allowance</u>	<u>Not Applicable</u>
<u>Total lighting wattage in enclosed space after luminaire alteration or modification as compared to existing lighting wattage</u>	<u>Not Applicable</u>	<u>Not Applicable</u>	<u>Existing wattage of all lighting in enclosed space reduced by 50% from full light output for hotel, office, retail occupancy, and reduced by 35% from full light output for all other occupancies</u>
<u>Section 130.1(a)1, 2, and 3 Area Controls</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes</u>
<u>Section 130.1(b) Multi-Level Lighting Controls – only for alterations to general lighting of enclosed spaces 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot</u>	<u>Yes</u>	<u>Yes OR bi-level with a minimum one step between 30-70 percent of lighting power regardless of luminaire type</u>	<u>No</u>
<u>Section 130.1(c) Shut-Off Controls</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes</u>

<u>Requirements that shall be met for Entire Luminaire Alterations and Luminaire Component Modifications for each enclosed space</u>	<u>Option 1</u>	<u>Option 2</u>	<u>Option 3</u> <u>(Not available for Entire Luminaire Alterations Criteria B, C or D)</u>
			<u>EXCEPT for</u> <u>130.1(c)1D,</u> <u>130.1(c) 6B,</u> <u>130.1(c) 6C,</u> <u>130.1(c) 7A,</u> <u>130.1(c) 8</u>
<u>Section 130.1(d) Automatic Daylight Controls</u>	<u>Yes</u>	<u>Not Required</u>	<u>Not Required</u>
<u>Section 130.1(e) Demand Responsive Controls – only for lighting alterations greater than 10,000 ft² in a single building, where the alteration also changes the area of the space, or changes the occupancy type of the space, or increases the lighting power</u>	<u>Yes</u>	<u>Not Required</u>	<u>Not Required</u>

K. Lighting Wiring Alterations. For each enclosed space, wiring alterations that add a circuit feeding luminaires; that replace, modify, or relocate wiring between a switch or panelboard and luminaires; or that replace lighting control panels, panelboards, or branch circuit wiring; shall:

- i. meet the lighting power allowance in Section 140.6;
- ii. meet the requirements in Sections 130.1(a)1, 2, and 3, 130.1(c)1A through C, 130.1(c)3, and 130.1(c)4;
- iii. for each enclosed space, be wired to create a minimum of one step between 30-70 percent of lighting power or meet Section 130.1(b); and
- iv. for each enclosed space where wiring alterations include 10 or more luminaires that provide general lighting within the primary sidelit daylit zone or the skylit daylit zone, meet the requirements of 130.1(d).

NOTE: As specified in Section 141.0(b)2I, alterations that include adding, removing, or replacing walls or ceilings resulting in redesign of the lighting system shall meet the requirements of Table 141.0-~~E~~ D.

EXCEPTION 1 to Section 141.0(b)2K. Alterations strictly limited to addition of lighting controls.

EXCEPTION 2 to Section 141.0(b)2K. In an enclosed space where wiring alterations involve ~~two or~~ fewer one luminaires.

EXCEPTION 3 to Section 141.0(b)2K. Alterations that would directly cause the disturbance of asbestos, unless the alterations are made in conjunction with asbestos abatement.

EXCEPTION 4 to Section 141.0(b)2K. Acceptance testing requirements of Section 130.4 are not required for wiring alterations where lighting controls are added to control 20 or fewer luminaires.

3. Performance approach.

A. The altered envelope, space-conditioning system, lighting and water heating components, and any newly installed equipment serving the alteration, shall meet the applicable requirements of Sections 110.0 through 110.9, Sections 120.0 through 120.6, and Sections 120.9 through 130.5.

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TABLE 141.0 E CONTROL REQUIREMENTS FOR ENTIRE LUMINAIRE ALTERATIONS

Control requirements that shall be met	Resulting lighting power, compared to the lighting power allowance specified in Section 140.6(e)2, Area Category Method	
	Lighting power is ≤ 85% of allowance	Lighting power is > 85% to 100% of allowance
Section 130.1(a)1, 2, and 3 Area Controls	Yes	Yes
Section 130.1(b) Multi-Level Lighting Controls — only for alterations to general lighting of enclosed spaces 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot	For each enclosed space, minimum one step between 30-70 percent of lighting power regardless of luminaire type, or meet Section 130.1(b)	Yes
Section 130.1(c) Shut-Off Controls	Yes	Yes
Section 130.1(d) Automatic Daylight Controls	Not Required	Yes
Section 130.1(e) Demand Responsive Controls — only for alterations > 10,000 ft ² in a single building, where the alteration also changes the area of the space, or changes the occupancy type of the space, or increases the lighting power	Not Required	Yes

2.2 Reference Appendices

There are no proposed changes to the Reference Appendices.