

CODES AND STANDARDS ENHANCEMENT INITIATIVE (CASE)

PG&E Comments on Proposed Changes to Nonresidential Lighting Retrofit Requirements in 2016 Title 24 Standards

Nonresidential Lighting Retrofits

2016 CALIFORNIA BUILDING ENERGY EFFICIENCY STANDARDS

March 19, 2015

California Energy Commission

DOCKETED

15-BSTD-01

TN 75493

MAR 19 2015

This report was prepared by PG&E's Statewide Codes and Standards Program that is funded, in part, by California utility customers under the auspices of the California Public Utilities Commission.

Copyright 2015 Pacific Gas and Electric Company.

All rights reserved, except that this document may be used, copied, and distributed without modification.

Neither PG&E nor any of its employees makes any warranty, express or implied; or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any data, information, method, product, policy or process disclosed in this document; or represents that its use will not infringe any privately-owned rights including, but not limited to, patents, trademarks or copyrights.

Introduction

This document contains comments on recent California Energy Commission (CEC) staff Building Efficiency Standards Title 24 code change proposals to the nonresidential lighting requirements associated with:

- luminaire components that are modified without moving the luminaire,
- luminaire alterations where only luminaires are being added moved or replaced,
- luminaire alterations that are part of other work such as tenant improvements (TI), and gut remodels, and
- lighting wiring alterations where wiring is added, modified or relocating wiring to provide power to new or relocated luminaires, lighting wiring is replaced or a new lighting panel is installed.

The CEC lighting retrofit proposal is a response to comments from members of the public that the current lighting retrofits standards are harming the retrofit industry. PG&E supports the CEC's efforts to consider options to minimize disruption to the retrofit industry while maintaining increasingly stringent energy efficiency standards. However, the California Investor Owned Utilities (IOUs) are specifically directed by the California Public Utilities Commission (CPUC) to perform advocacy for the benefit of California utility customers as part of our energy efficiency portfolio. PG&E is concerned that, unlike most of the other code change proposals, there is no CASE (codes and standards enhancement) report that documents the cost-effectiveness, feasibility, or energy savings associated with the proposed change.

Effective codes and standards are paramount to positioning California to meet our aggressive energy savings and greenhouse gas (GHG) emission reduction goals. The CEC has been at the forefront of developing building efficiency codes and appliance efficiency standards since 1977, saving Californians more than \$74 billion in reduced electricity bills during that time. PG&E believes strongly in the integral role codes and standards plays in meeting the state's aggressive energy savings goals. In fact, since 2000, the IOUs have worked closely with the CEC and other stakeholders to develop building efficiency codes and appliance efficiency standards that put our customers on the path to Zero Net Energy (ZNE). The lighting alterations adopted in the 2013 Title 24 standards are projected to save 650 GWh/yr alone for each year's retrofit construction activity.

PG&E is concerned that amending the 2013 Title 24 standards could weaken future of codes and standards efforts. The proposed code change will likely reduce the stringency of the lighting alteration requirements in Title 24 2016 as compared to the originally adopted 2013 version of Title 24, part 6. Thus, if any rollback to the standards were to occur, PG&E believes it should be data driven, thoroughly vetted, and carefully designed to minimize the energy losses from a reduction in code stringency while carefully targeting the key barriers to deep lighting retrofits.

PG&E firmly believes that it is our responsibility to ensure that adopted, stakeholder-vetted, cost-effective standards remain intact unless the appropriate data is gathered to support such changes, a comprehensive stakeholder process is undertaken to explore changing previously adopted standards, and all public rulemaking processes are followed. We question whether these changes, which reduce energy savings, support a negative declaration.

PG&E proposes to work with the CEC to develop a research plan in order to gain quantitative data to support any future proposals changing existing code.

If the Commission proceeds with modifying the current 2013 Title 24 nonresidential lighting retrofit standards, PG&E recommends the following proposal, which we believe will minimize loss of energy savings while accommodating most of the lighting retrofit industry's concerns.

Overview of PG&E's Proposal

PG&E's proposal encompasses the following objectives:

- Reduce compliance burden on lighting only alterations and luminaire modifications that occur in situ while maximizing the required energy savings from these retrofits. The main purpose is to make sure that code requirements are supportive of a robust lighting retrofit market.
- Maintain the stringency of codes that cover alteration work that rarely affects the simple alteration. This other type of work includes:
 - Gut remodels and tenant improvements where the suspended ceiling is replaced, walls are added or removed and the lighting systems are redesigned.
 - Wiring alterations where circuits are moved, new wiring is installed, or new lighting panels are installed etc.

This proposal also recognizes that what is needed to spur innovation and market activity in the short term is not necessarily what is needed in the longer term. In particular, over the next couple of years, high efficacy tubular fluorescent systems are still cost-effective retrofit options. There is still an incremental first cost and efficacy penalty for dimming fluorescent systems, although the efficacy penalty is more than offset by the controls related savings. Fluorescent systems are being rapidly replaced with dimmable LED systems so that by 2017, many of the cost and efficacy concerns about the dimmable lighting requirement in Section 130.1(b) will be addressed. What this implies is that there should be two proposals, one for the short term need of addressing short term disruptions to the lighting retrofit industry and a different proposal to address the long term policy goals of California's building infrastructure.

Findings upon Review of 2013 Code Language

From a review of the comments in the docket and interviews with commenters, the following statements have been made:

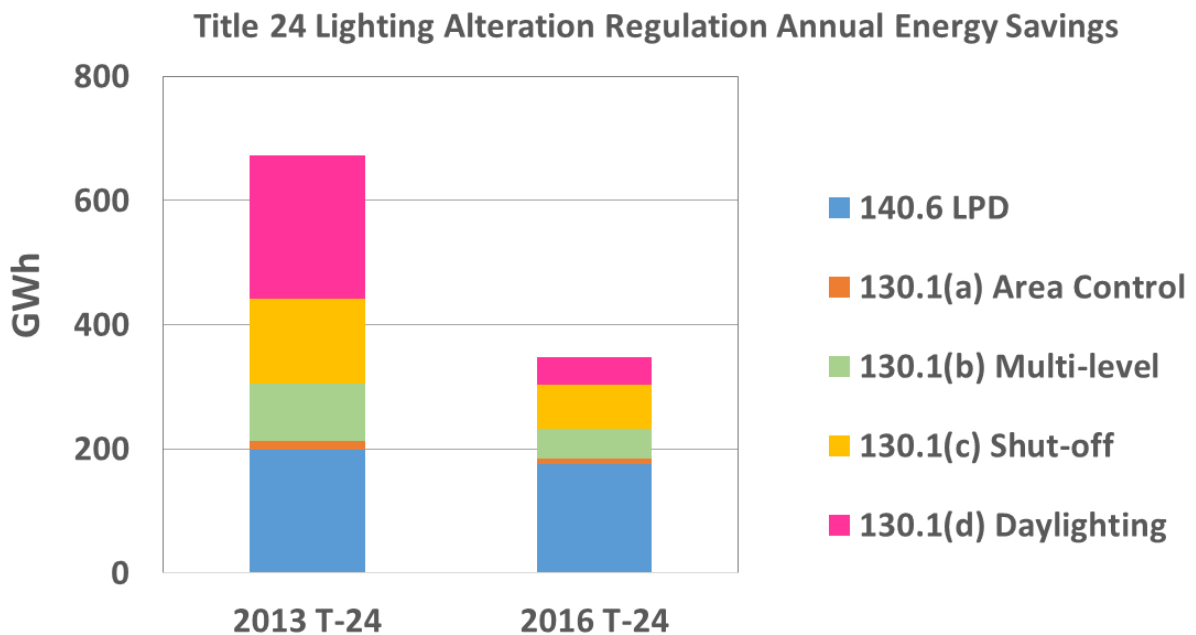
- Cost of permitting is excessive; this is not just the cost of the permit but the costs of filling out the paperwork when code is triggered, and the cost of the CLCATT to conduct or witness the acceptance test.
- Cost of calculating the LPD is excessive for a small job, as it requires the measurement of the area of spaces, which is a problem when the building plans are not available.
- The cost of developing plans when required by the local building department is excessive. Space plans are sometimes required for noting the placement of fixtures, drawing the daylight zones and the circuiting of controls.
- When altering lighting wiring the cost of added controls is excessive.

PG&E's findings are somewhat different:

- Code compliance costs have fixed and variable costs so that it is not reasonable to have the same level of code documentation and controls requirements for a small job as compared to a large job. However as the size of the remodel job increases the costs associated with controls are more manageable.
- Adding controls to open ceilings (such as warehouses) and in suspended ceilings (such as many offices) is significantly less expensive than adding controls to spaces with hard plaster ceilings. This issue may be mitigated in the future as wireless controls become more reliable, less expensive and more common.
- Adding controls and requiring detailed plans is more reasonable for a gut remodel or tenant improvement than for a simple lighting alteration.

- The requirements in Tables 141.0-E and 141.0-F are almost identical, so complexity could be reduced by combining this into one table.
- Luminaire component modification provisions rarely are applied to tenant improvement or gut remodel projects, so there is little risk that reduction in stringency for luminaire component modifications will affect gut remodels and tenant improvements. However there is an overlap in luminaire alterations and tenant improvements or gut remodels and we are concerned about the roll back in stringency where the LPD and controls requirements save significant energy.
- Daylighting controls are economic as a retrofit when more than 300 Watts are altered (see 2013 Daylighting CASE study).

The CEC staff's proposed effective removal of the daylighting requirements could result in a significant loss in energy savings between the 2013 and 2016 Title 24 standards. See the graph below, which indicates estimated annual energy savings for each year's retrofit construction activity.



The 2013 Title 24 lighting alteration energy savings include savings from new lighting power density (LPD) and controls requirements and expansion of scope when the alteration requirements are triggered. Prior to 2013, the code was not triggered until alterations replaced more than 50% of the luminaires in a space. In 2013 this threshold for luminaire alterations was reduced to 10% of the luminaires in the space. Prior to the 2013 standards, a luminaire alteration was defined as adding, replacing or removing and reinstalling a luminaire. The 2013 standards increased coverage to luminaire modifications in place that included lamp and ballast replacements and other retrofits that replace the light source and control gear (ballasts or drivers). Energy savings for the new controls and LPD requirements in the 2013 standards are based on the CEC 2013 Title 24 Impact Study and relevant 2013 Title 24 CASE studies, including Daylighting, Indoor Lighting Controls, Indoor Lighting-Retail, Control of Egress Lighting, Automated Lighting Controls and Switching Requirements in Multifamily and Hotel Corridors, Lighting in Warehouses and Libraries. Energy savings for the increase in scope of

alterations are based on the 2013 Title 24 Lighting Alterations and Modifications in Place CASE study.¹ The unit savings in the various CASE studies are expanded to statewide totals by making use of the assumptions embedded in the CEC 2013 Title 24 Impact Study which estimates that 489 Million sf/yr of floor area are receiving lighting alterations each year.² The reduced energy code savings estimates associated with lighting alterations for the 2016 code cycle use the same assumptions but correspondingly reduce the scope of coverage and reduced requirements associates with what the CEC staff have proposed in the 45-day language for the 2016 Title 24 upgrade. This proposal for 2016 excludes a wide range of currently regulated lighting alteration projects from future code regulation. As proposed by the 45 day language, the regulated lighting alteration floor area is estimated to be reduced to 313 Million sf/year and the areas subject to daylighting controls requirements are reduced to 17% of the area of coverage in the 2013 standards.

These findings have helped generate the following interpretation of the 2013 standards.

¹ Reports for these CASE studies can be found from the CEC website on 2013 Title 24 rulemaking (<http://www.energy.ca.gov/title24/2013standards/rulemaking/>).

² Assuming lighting systems are altered on average once every 15 years and California nonresidential building stock is 7.3 Billion square feet. See p. 25 *Impact Analysis: California's 2013 Building Energy Efficiency Standards* <http://www.energy.ca.gov/2013publications/CEC-400-2013-008/CEC-400-2013-008.pdf>

PG&E's Proposed Interpretation of the 2013 Lighting Retrofit Standards

The following alternate measures should be considered equivalent to the existing 2013 standards.

- For projects where less than 100 luminaires per building are having their components modified without removing the luminaires and the modified luminaires have a total rated input watts that are 20% less than the total rated watts of the original luminaires, the requirements in Section 141.0(b)2Iiii are considered to be met if the modified luminaires comply with the Area Controls requirements of Subsections 130.1(a)1, 2, and 3, and the Shut-OFF Controls requirements of Section 130.1(c).
- For projects where only lighting is being altered (not tenant improvements or gut remodels) and less than 100 luminaires per building are altered and the total rated input watts of the newly installed luminaires are 20% less than the total rated watts of the original luminaires being replaced, the requirements in Section 141.0(b)2Iii are considered to be met if the replacement luminaires comply with the area controls requirements of Subsections 130.1(a)1, 2, and 3, and the Shut-OFF control requirements of Section 130.1(c).
- For wiring alterations where less than 5 luminaires in a space served by the wiring alteration are in the sidelit and toplit zone, these luminaires are exempted from the requirements in Section 130.1(d).

Narrative:

This interpretation limits the lost savings to the hard-to-serve niches that are targeted by utility lighting retrofit programs. These lighting retrofit programs rarely serve gut remodels or tenant improvements. Additionally this proposal would limit this simplified compliance to smaller projects less than 100 luminaires. The rated power reduction is considered to be roughly equivalent to meeting the new construction LPD. The area controls and auto shut-off requirements yield about one third of the savings from the control requirements. In addition, we are proposing to leave the lighting controls requirements for wiring alterations mostly intact. The 45 day language proposed entirely removing the daylighting controls requirements entirely for wiring alterations and recent CEC staff proposals had suggested a threshold of 75 luminaires in the daylight zone. This proposal recommends that the proposed changes to the threshold for daylighting controls be dropped from the 75 luminaires to a 5 luminaires so the significant daylighting control savings from the 2013 standards (around 185 GWh/yr for each year's wiring alteration activity) are retained. For new construction, the threshold is 120 Watts, or approximately 2 luminaires. The 2013 daylighting CASE study calculated that a 300 Watt threshold (around 5 luminaires) was cost-effective for retrofit applications.³

³ p. 67, *Nonresidential Daylighting*. 2013 California Building Energy Efficiency Standards CASE Proposal http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/Lighting Controls Bldg Power/2013_CASE_NR_Daylighting_Oct_2011.pdf

PG&E's Proposed Change to the Lighting Retrofit Standards for the 2016 Title 24, part 6 Standards

- I. **Entire Luminaire Alterations.** Where greater than 20% of existing luminaires in an enclosed space are altered as specified in Subsections i through iii below, the alterations shall meet the lighting power allowance in Section 140.6 and the altered luminaires shall meet the applicable requirements in TABLE 141.0-E:
- i. Adding luminaires to the enclosed space; or
 - ii. Replacing entire luminaires in the enclosed space; or
 - iii. In an enclosed space, reinstalling a luminaire removed from the same space or elsewhere.

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

EXCEPTION 2 to Section 141.0(b)2I. For projects consisting of only luminaire replacements per ii above, and there are **less than 100 entire luminaire** alterations per building where replacement luminaires have at least **30 percent** lower power consumption compared to the original luminaires and the modified luminaires comply with the area controls requirements of Subsections 130.1(a)1, 2, and 3, the Shut-OFF controls requirements of Section 130.1(c)..

EXCEPTION 3 to Section 141.0(b)2I. In an enclosed space where only one luminaire is altered per Subsections ii and iii above.

EXCEPTION 4 to Section 141.0(b)2I. Alterations that would directly cause the disturbance of asbestos, unless the alterations are made in conjunction with asbestos abatement.

Narrative:

The changes to exception 2 apply to lighting only alterations, “projects consisting of only luminaire replacements per ii above,” (e.g. to clarify it does not apply to gut remodels or TI’s). Defining an upper limit based on 100 luminaires per building is easier to enforce than a limit based on luminaires per floor (as was the case in 2013). Enforcing requirements for a given project on a building basis more rationally addresses the fixed costs associated with compliance, how is a retrofit project with 70 luminaires per floor on two floors substantively different than 140 luminaires on a single floor? By using the term “project” this 100 luminaire limit to the exception recognizes that separate tenant improvements even on the same floor would be considered separately. The 30% reduction is deeper than what is proposed in the short term interpretation of the 2013 standards to reflect the expected migration to almost entirely LED retrofits by 2017 with deeper level of savings. The area controls and auto shut-off requirements yield about one third of the savings from the control requirements. This is written in the same format as the CEC exception that allows calculation of relative wattage reduction rather than LPD in response to concerns that LPD is hard to calculate.

TABLE 141.0-E Control Requirements for Lighting System Alterations

<u>Control requirements that shall be met when 20% or more of existing luminaires are altered</u>	<u>Resulting lighting power, compared to the lighting power allowance specified in Section 140.6(c)2</u>	
	<u>Lighting power is ≤ 85% of allowance</u>	<u>Lighting power is > 85% to 100% of allowance</u>
<u>Section 130.1(a)1, 2, and 3 Area Controls</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>For each enclosed space, minimum one step between 30-70 percent of lighting power regardless of luminaire type, or meet Section 130.1(b)</u>	<u>Yes</u>
<u>Section 130.1(c) Shut-Off Controls</u>	<u>Yes</u>	<u>Yes</u>
<u>Section 130.1(d) Automatic Daylight Controls</u>	<u>Not Required</u>	<u>Yes</u>
<u>Section 130.1(e) Demand Responsive Controls – only for alterations > 10,000 ft² in a single building, and where the alteration changes the area of the space, or occupancy type of the space, or increases the lighting power</u>	<u>Not Required</u>	<u>Yes</u>

J. Luminaire Component Modifications. Where greater than 20% of existing luminaires in an enclosed space are modified as specified in Subsections i through iii below, the modifications shall meet the lighting power allowance in Section 140.6, shall comply with the area controls requirements of Subsections 130.1(a)1, 2, and 3, the Shut-OFF controls requirements of Section 130.1(c) and shall not prevent or disable the operation of any multi-level, shut-off, or daylighting controls installed to control the luminaires:

- i. Replacing the ballasts or drivers and the associated lamps in the luminaire; or
- ii. Permanently changing the light source of the luminaire; or
- iii. Changing the optical system of the luminaire.

Lamp replacements alone and ballast replacements alone shall not be considered a modification of the luminaire provided that the replacement lamps or ballasts can be 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 in accordance to Section 140.6(a)3.

EXCEPTION 2 to Section 141.0(b)2J. Replacement of luminaire components in less than 100 luminaires per building where the modified luminaires have at least 30 percent lower power consumption compared to the original luminaires and the modified luminaires comply with the area controls requirements of Subsections 130.1(a)1, 2, and 3, the Shut-OFF controls requirements of Section 130.1(c).

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

Narrative:

The changes to exception 2 apply to fixture modifications when more than 20% of the fixtures are modified. This is done because one of the requirements is achieving the space LPD – something that might be over the top if only a few fixtures are modified per room. The 30% power reduction is deeper than what is proposed in the short term interpretation of the 2013 standards to reflect the expected migration to almost entirely LED retrofits by 2017 with deeper level of savings. The area controls and auto shut-off requirements yield about one third of the savings from the control requirements. The CEC's original changes proposed only the area control. This is written in the same format as the CEC exception that allows calculation of relative wattage reduction rather than LPD in response to concerns that LPD is hard to calculate.

K. Lighting Wiring Alterations. For each enclosed space, the following wiring alterations serving permanently installed lighting shall meet the lighting power allowance in Section 140.6 ,and the altered circuits and luminaires served by them shall meet the applicable requirements in Sections 130.1(a), (c), 130.1(d) for each enclosed space where 5 or more luminaires are located within the primary sidelit daylit zone and the skylit daylit zone, and for each enclosed space, minimum one step between 30-70 percent of lighting power

- i. Adding a circuit feeding luminaires; or
- ii. Replacing, modifying, or relocating wiring between a switch or panelboard and luminaires; or
- iii. Replacing lighting control panels, panelboards, or branch circuit wiring.

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

EXCEPTION 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.

Narrative:

We are proposing to leave the lighting controls requirements for wiring alterations mostly intact (drop the recent staff recommended threshold when daylighting controls are required from 75 to 5 luminaires) so the significant additional daylighting control savings (about half of total controls savings) from the 2013 standards are retained for those cases where circuits are rewired or moved. A careful analysis by the 2013 daylighting CASE report calculated a retrofit threshold of 300 Watts. This corresponds to 5 troffer type luminaires or around 3 warehouse luminaires. From the figure above this recaptures about 50% of the lighting control savings associated with the 2013 lighting alterations requirements. A roll-back to 75 fixtures as the threshold for daylighting controls is significantly less stringent than the 2008 standards which required daylighting controls when the daylit zone was greater than 2,500 sf.

Current 2013 Lighting Retrofit Code Language

Section 141.0 – Additions, Alterations, and Repairs to Existing Buildings That Will be Nonresidential, High-Rise Residential, and Hotel/Motel Occupancies and to Existing Outdoor Lighting for These Occupancies and to Internally and Externally Illuminated Signs

2. **Prescriptive approach.** The altered components of the envelope, or space conditioning, lighting 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 120.8 through 130.5; and ...

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, 130.5, 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. For each enclosed space, alterations to existing indoor lighting shall meet the following requirements:

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

EXCEPTION to Section 141.0(b)2Ii: For only a Lighting System Alteration in accordance with Section 141.0(b)2Iii, or a Luminaire Modifications-in-Place in accordance with Section 141.0(b)2Iiii; an existing incandescent, fluorescent or HID luminaire may be modified and classified as a luminaire having a different number of, or type of light source(s), provided all of the following conditions are met:

- a. The luminaire has been previously used and is in an existing installation; and,
- b. The modified luminaire is listed with the different number or type of light source(s) under the installed conditions; and
- c. The different light source(s) is not an LED lamp, integrated or nonintegrated type, as defined by ANI/IES RP-16-2010; and
- d. The modified luminaire does not contain:
 1. Unused fluorescent or HID ballast(s); or
 2. Unused HID or fluorescent lamp sockets; or
 3. Sockets used only for lamp support; or
 4. Screw sockets of any kind or for any purpose; and
- e. The wattage of the modified luminaire shall be published in the manufacturer's catalog based on accredited testing lab reports.

- ii. **Lighting System Alterations** shall meet the applicable requirements in TABLE 141.0-E and the following:

- a. Lighting System Alterations include alterations where an existing lighting system is modified, luminaires are replaced, or luminaires are disconnected from the circuit, removed and reinstalled, whether in the same location or installed elsewhere.

EXCEPTION 1 to Section 141.0(b)2Iii: Alterations that qualify as a Luminaire Modification-in-Place.

EXCEPTION 2 to Section 141.0(b)2Iii: Portable luminaires, luminaires affixed to moveable partitions, and lighting excluded in accordance to Section 140.6(a)3.

- iii. **Luminaire Modifications-in-Place** shall meet the applicable requirements in TABLE 141.0-F and the following:
- a. To qualify as a Luminaire Modification-in-Place, luminaires shall only be modified by one or more of the following methods:
 1. Replacing lamps and ballasts with like type or quantity in a manner that preserves the original luminaire listing.
 2. Changing the number or type of light source in a luminaire including: socket renewal, removal or relocation of sockets or lampholders, and/or related wiring internal to the luminaire including the addition of safety disconnecting devices.
 3. Changing the optical system of a luminaire in part or in whole.
 4. Replacement of whole luminaires one for one in which the only electrical modification involves disconnecting the existing luminaire and reconnecting the replacement luminaire.
 - b. Luminaire Modifications-In-Place shall include only alterations to lighting system meeting the following conditions:
 1. Luminaire Modifications-in-Place shall not be part of or the result of any general remodeling or renovation of the enclosed space in which they are located.
 2. Luminaire Modifications-in-Place shall not cause, be the result of, or involve any changes to the panelboard or branch circuit wiring, including line voltage switches, relays, contactors, dimmers and other control devices providing power to the lighting system.

EXCEPTION to Section 141.0(b)2Iiii2. Circuit modifications strictly limited to the addition of occupancy or vacancy sensors and class two lighting controls are permitted for Luminaire Modifications-in-Place
- iv. **Lighting Wiring Alterations** shall meet the applicable requirements in Sections 110.9, 130.1, and 130.4.
- a. Lighting Wiring Alterations include the following:
 1. Adding a circuit feeding luminaires.
 2. Modifying or relocating wiring to provide power to new or relocated luminaires.
 3. Replacing wiring between a switch or panelboard and luminaire(s).
 4. Replacing or installing a new panelboard feeding lighting systems.

EXCEPTION to Section 141.0(b)2Iiv. Lighting Wiring Alterations allowed for Luminaire Modifications-in-Place in accordance with Section 141.0(b)2Iiii.
 - v. Any lighting alteration that increases the installed lighting power in an enclosed space shall meet the requirements of Sections 110.9, 130.0, 130.1, 130.4, 140.3(c) and 140.6.
 - vi. Lighting Alterations and Luminaire Modifications-in-Place shall not exceed the lighting power allowance in Section 140.6.
 - vii. The following indoor lighting alterations are not required to comply with the lighting requirements in Title 24, Part 6:
 - a. Replacement in kind of parts of an existing luminaire that include only new lamps, lamp holders, or lenses, when replacement of those parts is not a Luminaire-Modification-in-Place in accordance with Section 141.0(b)2Iiii.
 - b. Lighting Alterations directly caused by the disturbance of asbestos.

EXCEPTION to Section 141.0(b)2Iviib: Lighting alterations made in conjunction with asbestos abatement shall comply with the applicable requirements in Section 141.0(b)2I.

- J. Alterations to existing outdoor lighting systems shall meet the following requirements:
- i. Alterations that increase the connected lighting load in a lighting application listed in TABLE 140.7-A or 140.7-B shall meet the applicable requirements of Sections 130.0, 130.2, 130.4, and 140.7; and
 - ii. In alterations that replace 10 percent or more of the luminaires in a lighting application listed in TABLE 140.7-A or 140.7-B, the altered luminaires shall meet the applicable requirements of Sections 130.0, 130.2 and 130.4; and
 - iii. In alterations that replace more than 50 percent of the luminaires in a lighting application listed in TABLE 140.7-A or 140.7-B, the lighting in that application shall meet the applicable requirements of Sections 130.0, 130.2, 130.4 and 140.7.

TABLE 141.0-E Requirements for Luminaire Alterations

Quantity of existing affected luminaires per Enclosed Space ¹	Resulting Lighting Power for Each Enclosed Space	Applicable Mandatory Control Provisions for Each Enclosed Space	Multi-level Lighting Control Requirements for Each Altered Luminaire
Alterations that do not change the area of the enclosed space or the space type			
Sum total < 10% of existing luminaires	Existing lighting power is permitted	Existing provisions are permitted	Existing controls are permitted
Sum total ≥ 10% of existing luminaires	≤ 85% of allowed lighting power per Section 140.6 Area Category Method	§130.1(a), (c)	Two level lighting control ² or §130.1(b)
	> 85% of allowed lighting power per Section 140.6 Area Category Method	§130.1(a), (c), (d) ³	§130.1(b)
Alterations that change the area of the enclosed space or the space type or increase the lighting power in the enclosed space			
Any number	Comply with Section 140.6	§130.0(d) ³ §130.1(a), (c), (d) ³ , (e)	§130.1(b)
1. Affected luminaires include any luminaire that is changed, replaced, removed, relocated; or, connected to, altered or revised wiring, except as permitted by EXCEPTIONS 1 and 2 to Section 141.0(b)2 2. Two level lighting control shall have at least one control step between 30 percent and 70 percent of design lighting power in a manner providing reasonably uniform illuminations 3. Daylight controls in accordance with Section 130.0(d) are required only for luminaires that are altered.			

TABLE 141.0-F-Requirements for Luminaire Modifications-in-Place

For compliance with this Table, building space is defined as any of the following: 1. A complete single story building 2. A complete floor of a multifloor building 3. The entire space in a building of a single tenant under a single lease 4. All of the common, not leasable space in single building			
Quantity of affected luminaires per Building Space per annum	Resulting Lighting Power per Each Enclosed Space Where $\geq 10\%$ of Existing Luminaires are Luminaire Modifications-in-Place	Applicable mandatory control provisions for each enclosed space ¹	Applicable multi-level lighting control requirements for each modified luminaire ²
Sum total < 40 Luminaire Modifications-in-Place	Existing lighting power is permitted	Existing provisions are permitted	Existing controls are permitted
Sum total ≥ 40 Luminaire Modifications-in-Place	$\leq 85\%$ of allowed lighting power per Section 140.6 Area Category Method	§130.1(a), (c)	Two level lighting control ³ Or §130.1(b)
	$> 85\%$ of allowed lighting power per Section 140.6 Area Category Method	§130.0(d) ⁴ §130.1(a), (c), (d) ⁴	§130.1(b)
1. Control requirements only apply to enclosed spaces for which there are Luminaire Modifications-in-Place. 2. Multi-level controls are required only for luminaires for which there are Luminaire Modifications-in-Place. 3. Two level lighting control shall have at least one control step between 30 percent and 70 percent of design lighting power in a manner providing reasonably uniform illuminations. 4. Daylight controls in accordance with Section 130.0(d) are required only for luminaires that are modified-in-place.			