Proposal Summary

2022 California Energy Code (Title 24, Part 6)

Nonresidential Indoor Lighting – Multi-zone Occupancy Sensing in Large Offices

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Prepared by: Marissa Lerner, Dr. Yao-Jung Wen, Energy Solutions

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during Round 2 of the utility-sponsored stakeholder meeting on March 5, 2020. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. Please share comments by email to info@title24stakeholders.com.

Measure Description

This proposal would harmonize with the 2018 IECC and require multi-zone occupancy sensing of general lighting in office spaces greater than 250 ft^2, or "large offices." This would require that large offices are divided up into smaller control zones controlled by occupancy sensors (maximum control zone size is 600 ft^2 in the IECC, but it could be a different size for Title 24, Part 6 based on the cost effectiveness analysis). When the subzones are unoccupied, each subzone must dim the lights to no greater than 20 percent of power or light, and when all subzones are unoccupied in the large office, the lights must be completely shut off. The benefits of this control include:

- Saves more energy than the current minimally compliant shut-off control (timeclock).
- Less disruptive to occupants that might stay after hours and have to walk over to enable the override control.
- Enables the occupied standby HVAC control that resets the thermostat and shuts off ventilation to the space when the entire space is unoccupied. Less ventilation air is required to be conditioned.
- Simplifies the standard. Depending upon the occupancy control subzone maximum size selected for the mandatory control this would displace the power adjustment factors (PAFs) for occupant sensing controls in large open plan offices.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions). Expected sections or tables of the proposed code (but not specific changes at this time) are highlighted in yellow.

Standards

Modify Section 130.1(c)6 as follows:

SECTION 130.1 – MANDATORY INDOOR LIGHTING CONTROLS

(c) Shut-OFF Controls. All installed indoor lighting shall be equipped with controls able to automatically reduce lighting power when the space is typically unoccupied.

…

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…

B. In library book stack aisles 10 feet or longer…

C. Lighting installed in corridors and stairwells…

D. General lighting in office spaces greater than 250 ft^2 shall be controlled by occupancy sensing controls that comply with all of the following:

a. The occupancy sensing controls shall be configured so that general lighting shall be controlled separately in control zones with floor areas not greater than 600 ft^2.

b. Within 20 minutes of the control zone being unoccupied, the occupancy sensing controls shall turn off or uniformly reduce lighting power to no more than 20 percent of full power.

c. Within 20 minutes of the entire office space being unoccupied, the occupancy sensing controls shall automatically turn off general lighting in all control zones in the space.

d. General lighting in each control zone shall be allowed to automatically turn on to full power upon occupancy within the control zone. When occupancy is detected in any control zone in the space, the general lighting in other control zones that are unoccupied shall operate at no more than 20 percent of full power.

Modify Section 130.1(f) as follows:

(f) Control Interactions. Each lighting control installed to comply with Section 130.1 shall permit or incorporate the functions of the other lighting controls required by this Section

…

8. For lighting controlled by automatic daylighting controls and by occupant sensing controls, the controls shall be configured so that power does not exceed the lesser of the allowed power by either control.

Reference Appendices

NA7.6.2.3 Occupancy Sensing Lighting Control Functional testing

For buildings with up to seven (7) occupancy sensors, all occupancy sensors shall be tested. For buildings with more than seven (7) occupancy sensors, sampling may be done on spaces with similar sensors and space geometries; sampling shall include a minimum of 1 occupancy sensor for each group of up to 7 additional occupancy sensors. If the first occupancy sensor in the sample group passes the acceptance test, the remaining building spaces in the sample group also pass. If the first occupancy sensor in the sample group fails the acceptance test the rest of the occupancy sensors in that group must be tested. If any tested occupancy sensor fails it shall be repaired, replaced or adjusted until it passes the test.

NA 7.6.2.3.1 Full or Partial-OFF Occupant Sensing Controls

This requirement is for areas where full or partial-OFF occupant sensing controls are required to comply with Section 130.1(c)6 A. – C.

For each sensor to be tested do the following:

(a) For a representative sample of building spaces, simulate an unoccupied condition. Verify and document the following:

1. Lights controlled by occupancy sensors turn off within a maximum of 20 minutes from the start of an unoccupied condition.

2. The occupant sensor does not trigger a false "on" from movement in an area adjacent to the space containing the controlled luminaires or from HVAC operation.

3. Signal sensitivity is adequate to achieve desired control.

(b) For a representative sample of building spaces, simulate an occupied condition. Verify and document the following:

1. Status indicator or annunciator operates correctly.

2. Lights controlled by occupancy sensors turn on immediately upon an occupied condition, OR sensor indicates space is "occupied" and lights are turned on manually (automatic OFF and manual ON control strategy).

NA 7.6.2.3.2 Multi-Zone Full or Partial-OFF Occupant Sensing Controls

This requirement is for multi-zone occupancy sensing in compliance with Section 130.1(c)6d.

For each occupancy sensor to be tested, do the following:

(a) Simulate an occupied condition in the subzone controlled by the occupancy sensor. Verify and document the following:

1. Lights controlled by the occupancy sensor turn on immediately upon occupancy of the subzone.

2. Measure the illuminance at a location in the subzone where the light output is due to the controlled lighting.

3. Signal sensitivity is adequate to achieve desired control.

(b) Simulate an unoccupied condition in the subzone controlled by the occupancy sensor. Confirm that at least one subzone within the greater controlled zone is occupied. Verify and document the following:

1. Lights controlled by the occupancy sensor uniformly reduce light output within a maximum of 20 minutes from the start of the unoccupied condition in the subzone.
2. Measure the illuminance at the same location as in Step (a)1. Verify that the light level during unoccupancy is no more than 20% of the full light output measured in Step (a)1.
3. The sensor does not trigger a false "on" from movement outside of the subzone.
4. Signal sensitivity is adequate to achieve desired control.

(c) Simulate an unoccupied condition in all subzones in the enclosed spaced (room). Verify and document the following:

1. All general lighting in the room turns off within 20 minutes from the start of the unoccupied condition.
2. Lighting control system or occupancy sensor dedicated to the HVAC system sends occupied standby signal to HVAC system (see NA7.##).