

Proposal Summary



Revise Automatic Daylighting Controls Exceptions

Updated: Tuesday, May 9, 2023

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Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on May 16, 2023. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by May 31, 2023.

Measure Description

The Revise Automatic Daylighting Controls Exceptions measure would adjust the wattage thresholds for when automatic daylighting controls are required in the skylit, primary sidelit, and secondary sidelit daylit zones. The change would modify Exception 3 to Section 130.1(d) and Exception 3 to Section 160.5(b)4D. Currently, the wattage threshold is 120W, meaning spaces with less than 120W of general lighting installed in the skylit daylit zones, primary sidelit daylit zones, or secondary sidelit daylit zones are not required to implement automatic daylighting controls. This measure aims to reduce the exemption threshold from 120W to 75W to align with Addendum O to ASHRAE 90.1 which reflects the appropriate threshold wattage based on the current efficacy of LED light sources. However, the new wattage threshold will ultimately be decided by cost effectiveness, technical feasibility, and other factors.

Data Needs/Stakeholder Information Requests

- **Technical Feasibility** – how well-established the technology or practice is in the industry
 1. What are the technical barriers to implementing automatic daylighting controls in spaces with a lower connected lighting load?
- **Market Readiness** – availability in the market, and certainty regarding performance, reliability, and cost
 1. What are the market barriers to implementing automatic daylighting controls in spaces with a lower connected lighting load?



2. What are the actual or perceived issues in implementing automatic daylighting controls in spaces with a lower connected lighting load?
- **Non-energy Benefits** – consumer or societal benefits such as improved health and safety, increased productivity, reduced water use, GHG emission reductions, reduced fossil fuel consumption
 1. Are there important non-energy benefits that should be accounted for?
 - **Costs:**
 1. What are the costs for installing automatic daylighting controls into a space with a lower connected lighting load for both new construction and alterations/retrofits:
 - What are all the components needed (wiring? photosensors? controls?) and costs for them?
 - Are there any additional costs in lighting design and planning?
 - How much time does it take for installation/labor/commissioning?
 - What are the maintenance costs?
 - What are other costs that need to be accounted for?

Data may be provided anonymously. To participate or provide information, please email Yao-Jung Wen, ywen@energy-solution.com, Jasmine Shepard, jshepard@energy-solution.com, or Christopher Uraine, curaine@energy-solution.com directly and cc info@title24stakeholders.com.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2022 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

SECTION 130.1 – MANDATORY INDOOR LIGHTING CONTROLS

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d) **Automatic daylighting controls.** ~~The general lighting in skylit daylit zones, primary sidelit daylit zones and secondary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall be provided with controls that automatically adjust the power of the installed lighting up and down to keep the total light level stable as the amount of incoming daylight changes. In any enclosed space where the total installed wattage of general lighting luminaires~~

completely or partially within skylit daylit zones is 75 W or greater, general lighting in the skylit daylit zone shall be controlled by automatic daylighting controls. For skylights located in an atrium, the skylit daylit zone definition shall apply to the floor area directly under the atrium and the top floor area directly adjacent to the atrium.

In any enclosed space where the total installed wattage of general lighting luminaires completely or partially within primary sidelit daylit zones is 75 W or greater, the general lighting in the primary sidelit daylit zones shall be controlled by automatic daylighting controls.

In any enclosed space where total installed wattage general lighting luminaires completely or partially within the primary sidelit daylit zones and secondary sidelit daylit zones is 150 W or greater, the general lighting in the primary sidelit daylit zones and secondary sidelit daylit zones shall be controlled by automatic daylighting controls. General lighting in the secondary sidelit daylit zones shall be controlled independently of the general lighting in the primary sidelit daylit zones.

Parking garage areas where the total installed wattage of the general lighting in the primary and the secondary sidelit daylit zones is 60 watts or greater, the general lighting in the combined primary and secondary sidelit daylit zones shall be controlled by automatic daylighting controls.

General lighting luminaires longer than 4 feet shall be evaluated in segments of 4 feet or less for allocating luminaire power to the different daylit zones.

The general lighting in skylit daylit zones, primary sidelit daylit zones and secondary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall be provided with controls that automatically adjust the power of the installed lighting in response to daylight availability in accordance with the following requirements.

1. All skylit daylit zones, primary sidelit daylit zones, secondary sidelit daylit zones, and the combined primary and secondary sidelit daylit zones in parking garages shall be shown on the plans.

NOTE: Parking areas on the roof of a parking structure are outdoor hardscape, not skylit daylit areas.

2. The automatic daylighting controls shall provide separate control for general lighting in each type of daylit zone. General lighting in overlapping skylit daylit zone and sidelit daylit zone shall be controlled as part of the skylit daylit zone. General lighting in overlapping primary and secondary sidelit daylit zones shall be controlled as part of the primary sidelit daylit zone. ~~Linear LED luminaires and other solid state lighting (SSL) light sources in linear form may be treated as linear lamps in increments of 4 feet segment or smaller, and each segment is separately controlled based on~~ General lighting luminaires longer than 4 feet

shall be controlled as segments of 4 feet or less and segments shall be controlled according to the type of the daylight zone in which the segment is primarily located.

3. The automatic daylighting controls shall:

A. For spaces required to install multilevel controls under Section 130.1(b), adjust lighting via continuous dimming or the number of control steps provided by the multilevel controls;

B. For each space, ensure the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available;

C. For areas other than parking garages, ensure that, when the daylight illuminance is greater than 150 percent of the illuminance provided by the controlled lighting when no daylight is available, the controlled lighting power in that daylight zone shall be reduced by a minimum of 90 percent; and

D. For parking garages, ensure that when daylight illuminance levels measured at the farthest edge of the secondary sidelit zone away from the glazing or opening are greater than 150 percent of the illuminance provided by the controlled lighting when no daylight is available, the controlled lighting power in the combined primary and secondary sidelit daylight zones shall be reduced by 100 percent.

4. Photosensors shall be located so that they are not readily accessible to unauthorized personnel.

5. The location where calibration adjustments are made to the automatic daylighting controls shall be readily accessible to authorized personnel but may be inside a locked case or under a cover which requires a tool for access.

6. Interactions with other lighting controls.

A. Where area controls are required, area controls shall be capable of turning off or decreasing light levels to below the light levels set by the daylighting controls.

b. Area controls shall be allowed to temporarily increase electric lighting light levels above the required levels in Section 130.1(d)3 if the controls are configured to reset electric lighting controls back to the Section 130.1(d)3 defaults after lights have been turned off or reduced by a manual control, occupancy sensor or timeclock.

Exception 1 to Section 130.1(d): Areas under skylights where it is documented that existing adjacent structures or natural objects block direct sunlight for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.

Exception 2 to Section 130.1(d): Areas adjacent to vertical glazing below an overhang, where the overhang covers the entire width of the vertical glazing, no vertical glazing is above the overhang, and the ratio of the overhang projection to the overhang rise is greater than 1.5 for South, East and West orientations or greater than 1 for North orientations.

~~**Exception 3 to Section 130.1(d):** Rooms where the combined total installed wattage of the general lighting in the skylit and primary sidelit zones is less than 120 watts are not required to have daylighting controls for those zones. Rooms where the total installed wattage of the general lighting in the secondary sidelit zones is less than 120 watts are not required to have daylighting controls for that zone.~~

~~**Exception 4 to Section 130.1(d):** Parking garage areas where the total installed wattage of the general lighting in the primary and the secondary sidelit daylit zones is less than 60 watts do not require automatic daylighting controls in the daylit zones.~~

Exception 3 5 to Section 130.1(d): Rooms that have a total glazing area of less than 24 square feet, or parking garage areas with a combined total of less than 36 square feet of glazing or opening.

Exception 4 6 to Section 130.1(d): For parking garages, luminaires located in the daylight adaptation zone.

EXCEPTION 5 7 to Section 130.1(d): Luminaires in sidelit daylit zones in retail merchandise sales and wholesale showroom areas.

SECTION 160.5 – MANDATORY INDOOR REQUIREMENTS FOR INDOOR AND OUTDOOR SPACES

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(b) **Common Services Area Lighting.** Lighting systems and equipment in multifamily common services areas shall comply with applicable provisions of Sections 160.5(b)1 through 160.5(b)4.

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4. Mandatory Indoor Lighting Controls. Multifamily common use areas shall comply with the applicable requirements of Sections 160.5(b)4A through 160.5(b)4F, in addition to the applicable requirements of Sections 110.9.

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D. Automatic Daylighting Controls. ~~The general lighting in skylit daylit zones, primary sidelit daylit zones, and secondary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall be provided with controls that automatically adjust the power of the installed general lighting up and down to keep the total light level stable as the amount of incoming daylight changes.~~ In any enclosed space where the total installed wattage of general lighting luminaires completely or partially within skylit zones is 75 W or greater, general lighting in the skylit zone shall be controlled by automatic daylighting controls. For skylights located in an atrium, the skylit daylit zones shall apply to the floor area directly under the atrium and the top floor area directly adjacent to the atrium.

In any enclosed space where the total installed wattage of general lighting luminaires completely or partially within primary sidelit daylit zones is 75 W or greater, the general lighting in the primary sidelit daylit zones shall be controlled by automatic daylighting controls.

In any enclosed space where total installed wattage general lighting luminaires completely or partially within the primary sidelit daylit zones and secondary sidelit daylit zones is 150 W or greater, the general lighting in the primary sidelit daylit zones and secondary sidelit daylit zones shall be controlled by automatic daylighting controls. General lighting in the secondary sidelit daylit zones shall be controlled independently of the general lighting in the primary sidelit daylit zones.

Parking garage areas where the total installed wattage of the general lighting in the primary and the secondary sidelit daylit zones is 60 watts or greater, the general lighting in the combined primary and secondary sidelit daylit zones shall be controlled by automatic daylighting controls.

General lighting luminaires longer than 4 feet shall be evaluated in segments of 4 feet or less for allocating luminaire power to the different daylit zones.

The general lighting in skylit daylit zones, primary sidelit daylit zones and secondary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall be provided with controls that automatically adjust the power of the installed lighting in response to daylight availability in accordance with the following requirements.

i. All skylit daylit zones, primary sidelit daylit zones, secondary sidelit daylit zones and the combined primary and secondary sidelit daylit zones in parking garages shall be shown on the plans.

Note: Parking areas on the roof of a parking structure are outdoor hardscape, not skylit daylit areas.

ii. The automatic daylighting controls shall provide separate control for general lighting in each type of daylit zone. General lighting in overlapping skylit daylit zone and sidelit daylit zone shall be controlled as part of the skylit daylit zone.

General lighting in overlapping primary and secondary sidelit daylight zone shall be controlled as part of the primary sidelit daylight zone. ~~Linear LED luminaires and other solid state lighting (SSL) light sources in linear form may be treated as linear lamps in increments of 4 feet segment or smaller, and each segment is separately controlled based on~~ General lighting luminaires longer than 4 feet shall be controlled as segments of 4 feet or less and segments shall be controlled according to the type of the daylight zone the segment is primarily located.

iii. The automatic daylighting controls shall:

- a. For spaces required to install multilevel controls under Section 160.5(b)4B, adjust lighting via continuous dimming or the number of control steps provided by the multilevel controls;
- b. For each space, ensure the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available;
- c. For areas other than parking garages, ensure that when the daylight illuminance is greater than 150 percent of the illuminance provided by the controlled lighting system when no daylight is available, the controlled lighting power in that daylight zone shall be reduced by a minimum of 90 percent; and
- d. For parking garages, ensure that when daylight illuminance levels measured at the farthest edge of the secondary sidelit zone away from the glazing or opening are greater than 150 percent of the illuminance provided by the controlled lighting when no daylight is available, the controlled lighting power in the combined primary and secondary sidelit daylight zones shall be reduced by 100 percent.

iv. Photosensor shall be located so that they are not readily accessible to unauthorized personnel.

v. The location where calibration adjustments are made to the automatic daylighting controls shall be readily accessible to authorized personnel but may be inside a locked case or under a cover that requires a tool for access.

vi. Interactions with other lighting controls.

a. Where area controls are required, area controls shall be capable of turning off or decreasing light levels to below the light levels set by the daylighting controls.

b. Area controls shall be allowed to temporarily increase electric lighting light levels above the required levels in 160.5(b)4Diii if the controls are configured to reset electric lighting controls back to the 160.5(b)4Diii defaults after lights have been turned off or reduced by a manual control, occupancy sensor or timeclock.

Exception 1 to Section 160.5(b)4D: Areas under skylights where it is documented that existing adjacent structures or natural objects block direct sunlight for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.

Exception 2 to Section 160.5(b)4D: Areas adjacent to vertical glazing below an overhang, where the overhang covers the entire width of the vertical glazing, no vertical glazing is above the overhang, and the ratio of the overhang projection to the overhang rise is greater than 1.5 for south, east and west orientations or greater than 1 for north orientations.

~~**Exception 3 to Section 160.5(b)4D:** Rooms where the combined total installed wattage of the general lighting in the skylit and primary sidelit zones is less than 120 watts are not required to have daylighting controls for those zones. Rooms where the total installed wattage of the general lighting in the secondary sidelit zones is less than 120 watts are not required to have daylighting controls for that zone.~~

~~**Exception 4 to Section 160.5(b)4D:** Parking garage areas where the total installed wattage of the general lighting in the primary and the secondary sidelit daylit zones is less than 60 watts do not require automatic daylighting controls in the daylit zones.~~

Exception 3 5 to Section 160.5(b)4D: Rooms that have a total glazing area of less than 24 square feet, or parking garage areas with a combined total of less than 36 square feet of glazing or opening.

Exception 4 6 to Section 160.5(b)4D: For parking garages, luminaires located in the daylight adaptation zone and luminaires for only dedicated ramps. Daylight adaptation zone and dedicated ramps are defined in Section 100.1.

Exception 5 7 to Section 160.5(b)4D: Luminaires in sidelit daylit zones in retail merchandise sales and wholesale showroom areas.