DOCKETED	
Docket Number:	22-BSTD-01
Project Title:	2025 Energy Code Pre-Rulemaking
TN #:	250676
Document Title:	CLTC, University of California Comments - 2025 Title 24 Lighting Language Cleanup Initiative - Initiative Overview & Findings
Description:	California Lighting Technology Center (CLTC), University of California
Filer:	System
Organization:	California Lighting Technology Center, University of California
Submitter Role:	Public
Submission Date:	6/20/2023 11:23:15 AM
Docketed Date:	6/20/2023

Comment Received From: California Lighting Technology Center, University of California
Submitted On: 6/20/2023
Docket Number: 22-BSTD-01

2025 Title 24 Lighting Language Cleanup Initiative - Initiative Overview & Findings

The California Lighting Technology Center at UC Davis, in collaboration with Southern California Edison, RMS Energy Consulting LLC, and the California Energy Alliance, established a working group of industry stakeholders to develop recommendations that simplify and clarify the nonresidential and residential lighting and lighting controls language currently contained in the 2022 Title 24 Building Energy Efficiency Standards (Energy Code). Specifically, the Energy Code sections addressed include 100.1, 120.6, 130.1, 130.2, 130.3, 130.5, 140.6, 140.8, 150.0, 160.5, Appendix NA7, Appendix JA8, and the Compliance Manual.

The goal of this work is to improve code comprehension and compliance among contractors, code officials, building owners, and others involved in regulated lighting projects in California by simplifying lighting-related 2025 Energy Code language.

Please see the attached document for the Initiative's overview, findings, and recommendations. The Initiative's membership kindly requests that the findings and recommendations in this report be considered for inclusion in the 2025 Energy Code.

Additional submitted attachment is included below.

2025 Title 24 Lighting Language Cleanup Initiative

Initiative Overview & Findings

Prepared by

Prepared for California Energy Commission

June 2023

TABLE OF CONTENTS

LIST OF FIGURES

Page

LIST OF TABLES

Page

Acronyms

Acronym	Definition
ADA	Americans with Disabilities Act
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BUG	Backlight, Uplight, Glare
Energy Code	Building Energy Efficiency Standards, Title 24, Energy Standards
EMCS	Energy Management Control System
IECC	International Energy Conservation Code
LPD	Lighting Power Density
NEC	National Electrical Code
PAF	Power Adjustment Factor
PPE	Photosynthetic Photon Efficacy
Title 24	Building Energy Efficiency Standards

Executive Summary

The California Lighting Technology Center, in collaboration with Southern California Edison, RMS Energy Consulting LLC, and the California Energy Alliance, established a working group of industry stakeholders to develop recommendations that simplify and clarify the nonresidential and residential lighting and lighting controls language contained in the 2022 Title 24, Part 6 Building Energy Efficiency Standards (Energy Code). Specifically, the Energy Code sections addressed include 100.1, 120.6, 130.1, 130.2, 130.3, 130.5, 140.6, 140.8, 150.0, 160.5, Appendix NA7, Appendix JA8, and the Compliance Manual.

The goal of this work is to improve code comprehension and compliance among contractors, code officials, building owners, and others involved in regulated lighting projects in California by simplifying lighting-related Energy Code language.

Based on guidance provided by the California Energy Commission, the project team focused on targeting participation for the new *Energy Code Lighting Language Cleanup Initiative* from six key stakeholder groups: manufacturers, lighting designers & energy consultants, system owners & end users, installers, utilities & representatives, inspectors & building officials.

Including the project team and subject-matter-expert guests, 40 participants were active over the initiative's duration. To ensure the roles & expectations for participation were fully understood, the project team established *Initiative Guidelines* and provided the document to the participants during the kickoff meeting.

The project team hosted a public survey to gauge which Energy Code lighting topics were of interest to stakeholders. Twenty lighting-related topics were presented to the working group, who prioritized 19 topics via an intake survey conducted over February and March of 2022. The Energy Code Lighting Language Cleanup Initiative recommends 71 unique action items to simplify and clarify the language in the 2022 Energy Code. Types of recommendations include definition updates, terminology alignment with National & International Energy Codes, and the removal of language that adds unnecessary complexity.

Ideas generated by this initiative considered 'beyond simplification and/or clarification' were compiled and shared with the California Energy Commission, the Statewide CASE team, and the California Energy Alliance for consideration in their 2025 and 2028 Energy Code cycle measure proposals.

Introduction

The California Lighting Technology Center, in collaboration with Southern California Edison, RMS Energy Consulting LLC, and the California Energy Alliance, established a working group of industry stakeholders to develop recommendations that simplify and clarify the nonresidential and residential lighting and lighting controls language contained in the 2022 Title 24, Part 6 Building Energy Efficiency Standards (Energy Code). Specifically, the Energy Code sections addressed include 100.1, 120.6, 130.1, 130.2, 130.3, 130.5, 140.6, 140.8, 150.0, 160.5, Appendix NA7, Appendix JA8, and the Compliance Manual.

The goal of this work is to improve code comprehension and compliance among contractors, code officials, building owners, and others involved in regulated lighting projects in California by simplifying lighting-related Energy Code language.

To address this goal, the project team:

1. Launched an industry-focused *Energy Code Lighting Language Cleanup Initiative* and hosted stakeholder meetings on 19 targeted lighting-related Energy Code topics to solicit a wide range of perspectives, comments, and recommendations,

2. Collected Energy Code cleanup and measure ideas and shared them with the California Energy Commission, the Statewide CASE team, and the California Energy Alliance for consideration in their 2025 and 2028 Title 24 portfolios,

3. Reviewed working drafts with the Energy Commission to discuss the direction of recommendations,

4. Identified ideas that required additional stakeholder feedback in collaboration with the Energy Commission,

5. Presented key Initiative ideas from Step 4 at Title 24 Stakeholder Workshops to solicit public comments and compiled presentation/stakeholder comments are provided in Appendix 5, and

6. Finalized and docketed recommendations with the California Energy Commission for the 2025 Title 24 cycle.

Background

Based on guidance provided by the California Energy Commission, the project team focused on targeting participation in the new *Energy Code Lighting Language Cleanup Initiative* from six key stakeholder groups:

- Manufacturers
- Lighting Designers & Energy Consultants
- System Owners & End Users
- Installers
- Utilities & representatives
- Inspectors & Building Officials

Seventy-six individuals representing these stakeholder groups were invited to participate. In addition, the project team officially announced the call to participate on the CLTC website.[1] Figure 1 provides the breakdown by stakeholder group, number of individuals invited, and percent of total invited.

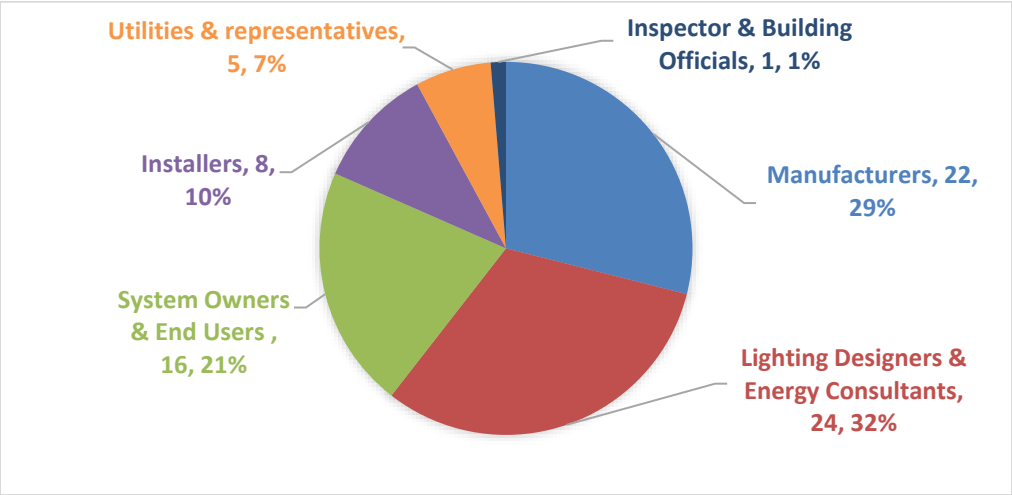


Figure 1: Seventy-six individuals were invited to participate in the initiative representing six key stakeholder groups.

Including the project team and subject-matter-expert guests, 40 participants were active over the initiative's duration. This is a 53 percent engagement rate for the 76 individuals originally invited. To ensure the roles & expectations for participation were fully understood, the project team established *Initiative Guidelines* and provided the document to the participants during the kickoff meeting. (Appendix 4)

The project team hosted a public survey to gauge which Energy Code lighting topics were of interest to stakeholders.[1] Twenty lighting-related topics were presented to the working group, who prioritized 19 topics via an intake survey conducted over February and March of 2022. One topic was canceled due to project timing. Over the initiative's duration, stakeholder participation was recorded during monthly meetings and is provided in Table 1.

Table 1: Lighting topics identified for cleanup activities.

Topic	Stakeholder Participants	Stakeholder Engagement (Out of 40)
Automatic Daylighting Controls	10	29%
Demand Responsive Controls	10	29%
Multilevel Lighting Controls	9	26%
Outdoor Lighting	9	26%
Control Interactions	8	24%
Shut-OFF Controls	7	21%
Lighting Power Allowances	7	21%
Controlled Environment Horticulture Lighting	7	21%
Overall Structure of the Energy Code	6	18%
Residential	6	18%
Manual Area Controls	5	15%
Multifamily Buildings	5	15%
Sign Lighting	4	12%
Power Adjustment Factors	3	9%
Lighting Wattage Exclusions	3	9%
Acceptance Testing Requirements	3	9%
Electrical Power Distribution	3	9%
Compliance Manual	2	6%
Lighting Definitions	2	6%
Compliance Forms*	N/A	N/A

* Canceled due to timing of initiative (September 2022) vs. publication of 2022 forms (January 2023)

Regular meetings for each of the 19 prioritized topics were scheduled using polling tools to determine when the majority of interested participants could join. During each meeting, participants were provided with the 2022 Title 24 lighting language for each topic and a forum to voice their opinions via monthly video conference calls and online

[1] https://cltc.ucdavis.edu/project/energy-code-lighting-language-cleanup-initiative

shared documents.[2] For participants that could not attend the meetings, they were encouraged to add their recommendations to the online shared documents directly.

A simple majority agreement of the subcommittee was necessary to include an idea as part of the initiative's recommendations. A summary of the initiative's recommendations is provided in the 'Summary Findings' section of this report. The corresponding redline language of the 2022 Energy Code and the clean 2025 Energy Code language are provided in Appendix 1 and Appendix 2, respectively.

Ideas generated by this initiative considered 'beyond simplification and/or clarification' were compiled and shared with the California Energy Commission, the Statewide CASE team, and the California Energy Alliance for consideration in their 2025 and 2028 Energy Code cycle measure proposals. These ideas are documented in Appendix 3.

[2] https://docs.google.com/spreadsheets/d/1noGId9bXu0ZLgHRe3McMztmf0NnS66_R/edit?usp=sharing&ouid=116695575317984020214&rtpof=true&sd=true

Summary Findings

The Energy Code Lighting Language Cleanup Initiative recommends the following 71 action items to simplify and clarify the language in the 2022 Energy Code. Types of recommendations include definition updates, terminology alignment with National & International Energy Codes, and the removal of language that adds unnecessary complexity.

Energy Code Structure

The *Energy Code Structure* subcommittee looked beyond the lighting sections of the code and focused recommendations on the entire framework of the Energy Code. The recommendations from this group may have a broader and longer-term impact versus other recommendations related to just the cleanup of code requirements. The Energy Code Structure subcommittee recommends the following action items to simplify and clarify language as written in the 2022 Energy Code.

1. Move the online version of the Energy Code to the CEC's website and add modern digital features in compliance with ADA requirements to improve accessibility and compliance.[3] Recommended features include:
    a. Expand existing bookmark features into the document body.
        i. Add hyperlinks to tables, defined terms, and any referenced Standards/Appendices/Manuals
    b. Add a flowchart/decision tree feature for projects with relevant links to the local jurisdiction's Codes & Standards. This may be best accomplished in partnership with Energy Code Ace as an expansion of the *Virtual Compliance Assistant* and *Reference Ace* tools.
    c. Add font/color formatting to help differentiate between sections of the code and visual indicators to determine where a reader is in the code.
    d. The online version, owned and updated by the CEC, allows for the CEC to collect comments and suggested edits to the Energy Code for future cleanup initiatives.
2. Reorganize Energy Code to improve accessibility and reduce lookup time.
    a. Move Tables to follow the language where it is first introduced.
    b. Italicize defined terms.
3. Update the sub-section naming convention to support moving the code to an online format and automating it into software from a coding perspective.[4]

[3] This idea was supported by 79% of attendees at the Stakeholder Workshop.

a. Add periods after sub-section letters and numerals, for example, Section 170.2(c)4Niv would change to Section 170.2(c)4.N.iv.

4. Update/add a better reference to Healthcare Facility(ies) throughout Energy Code to properly reference this exempted space type to reduce ambiguity related to the code sections that reference healthcare facilities.

Nonresidential Mandatory Requirements

Manual Area Controls

The *Manual Area Controls* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 130.1(a):

1. Rename the section to 'Manual Control' to align with International Energy Conservation Code (IECC).
2. Simplify language by using the term 'enclosed space' for interior and 'area' for exterior. This aligns with the convention used in ASHRAE 90.1 and IECC.
3. Simplify 130.1(a)2 by removing Exception 1 and adding the summarized version to the requirement.
    a. Recommend adding 'OR be located such that the controlled lighting/visual display can be seen when operating the controls.' to the existing 2022 Energy Code, Section 130.1(a)2 language.

Multilevel Lighting Controls

The *Multilevel Lighting Controls* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 130.1(b):

1. Delete Table 130.1-A Multilevel Lighting Controls and Uniformity Requirements and add 'and maintain illuminance uniformity by providing continuous dimming from 10-100 percent power' to the language of Section 130.1(b).[5] This recommendation is based on the passage of AB-2208 in 2022.[6]
    a. If deleting Table 130.1-A in its entirety is not feasible, the subcommittee recommends simplifying Table 130.1-A by removing duplicate light source types and the uniformity column.[7] By removing the uniformity column, the following language shall be added to Section 130.1(b) 'Uniformity of illuminance shall not be reduced by multilevel lighting controls'.

---

[4] This idea was supported by 42% of attendees at the Stakeholder Workshop.

[5] This idea was supported by 62% of attendees at the Stakeholder Workshop.

[6] AB-2208 Fluorescent lamps: sale and distribution: prohibition.

[7] This idea was supported by 38% of attendees at the Stakeholder Workshop.

2. Delete the classroom exception based on the increased cost-effectiveness of today's continuous dimming LED products compared to stepped dimming LED products.[8]

Shut-OFF Controls

The *Shut-OFF Controls* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 130.1(c):

1. Require occupant sensing control zones to be provided on reflected ceiling plans, similar to automatic daylighting control requirements. This will allow the requirements related to control zone size in Section 130.1(c)6D to be more easily reviewed and enforced during plan check, acceptance testing, and inspection phases of a project.
2. Simplify wording by removing redundant phrasing throughout Section 130.1(c).
3. Move means-of-egress exception from 130.1(c)1 to 130.1(c).
4. Add time delay language to Section 130.1(c)1 to reduce lookup time from the device requirement in Section 110.9.
    a. 'Set to no more than a 20-minute time delay.'
5. Add a reference to 'control zones' as opposed to 'controls' in Section 130.1(c)1.
6. Align Section 130.1(c)6Dii and iv language to both discuss in terms of '20 percent of full power'.
7. Delete Exception to Section 130.1(c)6D for task lighting, as it is already addressed by the requirement applying to general lighting only.
8. Consolidate stairwell and corridor requirements to 130.1(c)6 and remove from 130.1(c)7.

Automatic Daylighting Controls

The *Automatic Daylighting Controls* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 130.1(d):

1. Rename the section to align with IECC and ASHRAE 90.1 to be 'Daylight Responsive Controls' while maintaining the existing definitions in the Energy Code.

---

[8] The subcommittee recognizes the removal of the classroom exception may be a substantive change and could require additional cost-effectiveness analysis. This recommendation has been proposed to the California Energy Alliance, and they will look to address it in a 2025 measure proposal focused on broader Multilevel Lighting Controls updates.

2. Add luminaire location clarification from Compliance Manual to general requirement language.
    a. …general lighting 'that is at least 50 percent' in…
3. Add reworded language from the compliance manual/control interactions section:
    a. In spaces required to have multilevel lighting controls (Section 130.1(b)), the multilevel lighting controls shall be permitted to override the light level specified by the daylight responsive control.

Demand Responsive Controls

The *Demand Responsive Controls* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 130.1(e):

1. Replace the term 'communication' with 'demand responsive signal' in Section 110.12(a)4.
2. Add clarifying language to denote where DR controls for lighting and controlled receptacles must be installed.

Control Interactions

The *Controls Interactions* subcommittee recommends deleting Section 130.1(f) as it believes the requirements are not necessary given the requirements in Sections 130.1 and 110.9.[9]

If deleting in its entirety is not feasible for reasons not considered by the subcommittee, the following action items are recommended to simplify the 2022 Energy Code, Section 130.1(f):

1. Add referenced Section names and numbers.
2. Add an overview table to summarize current requirements.
3. Add shut-off requirements from Section 130.1(c)6D.

For both pathways, it is recommended that additional explanations be provided in the Compliance Manual to further explain the control relationships. Specifically, the relationship between dimming and daylighting controls.

Outdoor Lighting

The *Outdoor Lighting* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 130.2:

[9] 62% of attendees at the Stakeholder Workshop reported that they do not use the Control Interactions section of the Energy Code, supporting its deletion.

1. Add the BUG table and associated language to Section 130.2(b) which is currently in CALGreen (Part 11).
2. Simplify existing 'by at least 50 percent and no more than 90 percent' language in 130.2(c)2B and 130.2(c)3B by removing 'no more than 90 percent' language.
3. Rename 'Bilaterally symmetric outdoor wall mounted luminaires' to 'wall mounted luminaires.'
4. Restructure Section 130.2(c)3A to be requirements with exceptions.
5. Move the following sentence to the compliance manual to follow the overall recommendation that 'may' language from the Energy Code should be placed in the compliance manual.
    a. "Motion sensing controls may be installed for other outdoor lighting and in combination with other outdoor lighting controls."

Controlled Environment Horticulture Lighting

The *Controlled Environment Horticulture* Lighting subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 120.6(h):

1. Update the Covered Processes row in Table 100.0-A to explicitly include horticulture lighting.
2. Combine *Indoor Growing* and *Greenhouse* lighting sections into one section for 'horticulture lighting' with a table for minimum PPE requirements.

Electrical Power Distribution

The *Electrical Power Distribution* subcommittee recommends the following action items to simplify the 2022 Energy Code, Section 130.5:

1. Simplify language in 130.5(d)1 to remove repeated terminology, 'with the automatic time switch control requirements.'
2. Clarify language in 130.5(d)2 by replacing the term 'split-wired' with the industry-standard term 'multiple receptacle device', which aligns with the 2020 National Electrical Code (NEC).
3. Simplify language in 130.5(d)3 to remove repeated terminology 'and durable' to align with the 2020 National Electrical Code (NEC).
4. Update hotel guest room time delay requirement in Section 130.5(d)4 to align with 130.1(c)8 (20 minutes vs. 30 minutes).[10]
5. Move plug-in device content, which is currently listed as a NOTE, to the main requirement.

[10] 50% of attendees at the Stakeholder Workshop reported that this change would not impact their ability to meet Energy Code.

Nonresidential Prescriptive Requirements

Outdoor Lighting

The *Outdoor Lighting* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 140.7:

1. Add a column to Table 140.7-B to clarify when additional wattage is added to total hardscape allowances. This would address if the additional wattage allowance to be applied is to the whole project vs. the specified application.

Sign Lighting

The *Sign Lighting* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 140.8:

1. Remove references to alternate light sources that are no longer utilized per the *Virtual Compliance Assistance* data
    a. High-pressure sodium
    b. Metal halide lamps
    c. Fluorescent lighting systems
    d. Compact fluorescent lamps

Lighting Power Allowances

The *Lighting Power Allowances* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 140.6:

1. Align the 2022 Energy Code building/area types with ASHRAE building/area type names for designers/professionals working with both ASHRAE and Title 24 Energy Codes
2. Remove the Tailored Method and modify the LPD and additional power allowances for the Area Category Method for the most used Tailored Method space type categories to ensure that energy use allowances do not increase overall.[11, 12]
    a. If deleting the Tailored Method in its entirety is not feasible, the subcommittee recommends simplifying the Tailored Method tables in

[11] This idea was supported by 80% of attendees who voted at the February Stakeholder Workshop.

[12] 58% of attendees who voted at the February Stakeholder Workshop reported that they never use the Tailored Method, while 42% said they use it on 0-25% of their projects.

Section 140.6 to tie allowances more directly to Primary Function Areas in one table (Table 140.6-D).

Methodology & Background for the Simplification of the Tailored Method

To simplify Section 140.6 and the support materials – such as the compliance manual, forms, software, training, etc. – the subcommittee discussed options to accommodate layered lighting designs. The digitally available 2019 indoor lighting compliance data was analyzed to understand which compliance pathways are being used in actual lighting projects to comply with power allowances. Data showed that 98% of projects complying prescriptively used the Complete Building Method or the Area Category Method, and less than 2% of projects used the Tailored Method.[13]

Three options were developed by the subcommittee and presented at the May 2023 Stakeholder workshop:

Option 1: Eliminate Tailored Method, and include additional wall/floor/task and display case allowances under Area Category Method for some Function Areas

Option 2: Eliminate Tailored Method, and bring the IECC allowances into Area Category Method for some Function Areas

Option 3: Simplify Tailored requirements and code language including Table 140.6-D

Twenty-two stakeholders ranked these options in order of most desirable (1) to least desirable (3). Option 1, removing Tailored Method and adding specialty allowances to Area Category Method ranked as most desirable. See Appendix 5 for more detail and a summary of stakeholder input.

Power Adjustment Factors

The *Power Adjustment Factors* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 140.6(a)2:

1. Require Occupancy Sensor zones to be shown on plans for *Occupant Sensing Controls in Offices Larger than 250 Square Feet* (PAF 2)
2. Clarify language for *Demand Responsive Controls* to include, "If DR controls are required, then this PAF is not available for use."

Lighting Wattage Exclusions

The *Lighting Wattage Exclusions* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Section 140.6(a)3:

[13] Data collected for 12,520 indoor lighting projects through Virtual Compliance Assistant and EnergyPro tools under the 2019 Standards.

1. Align definition of Temporary Lighting (Section 140.6(a)3N) with other codes where possible.
    a. Title 24 definition: Plug in lighting that does not persist for more than 60 consecutive days or more than 120 days per year.
    b. NEC 527 Part 3: Decorative, temporary lighting up to 90 days.
2. Add the name of buildings categorized as 'U buildings' to reduce look-up time.
    a. Accessory or miscellaneous use.

Acceptance Testing Requirements

The *Acceptance Testing Requirements* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code, Appendix NA7:

1. Delete "and to related construction documents (plans or specifications)" in NA7.2 to clarify that ATT applies to all relevant mandatory requirements for each project.
2. Add/move General Requirements from the Compliance Manual to NA7.3 to further clarify roles & responsibilities.
    a. "It is the responsibility of the designer to specify products that meet these requirements. It is the responsibility of the installer to comply with all the mandatory requirements, even if the plans mistakenly do not. Code enforcement officials, in turn, must check that the mandatory features and specified devices are installed."
3. Add acceptance testing language from NA7.6.5.2 to Section 110.12(e).
    a. "During a demand response event, the demand responsive controlled receptacle shall not be capable of being overridden to turn ON by automatic shut-off controls or any manual control."

Residential Lighting

The *Residential Lighting* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code.

1. Restructure 'Luminaire Requirements' Section 150.0(k)1A.
    a. Rename section 'Light Source Requirements'
    b. Combine Section 150.0(k)1A and 1B by adding "and lamps" to Section 150.0(k)1A.
    c. Delete Table 150.0-A and refer directly to JA8 in Section 150.0(k)1A. Add items in the left column of Table 150.0-A as new Exception 4.[14]

[14] This idea was supported by 53% of the Stakeholder Workshop attendees.

2. Simplify Section 150.0(k)1D by stating the requirements,
    a. "Lamps and other separable light sources in enclosed or recessed luminaires shall be compliant with the JA8 elevated temperature requirements, including marking requirements."
3. Move Section 150.0(k)2B to Section 110.9 and/or combine it with Section 150.0(k)2D.
4. Add section names to each section reference.
5. Delete examples of habitable spaces in Section 150.0(k)2F,
    a. "including but not limited to living rooms, dining rooms, kitchens, and bedrooms".
6. Split Section 150.0(k)2F into two subsections to separate the dimming control device requirement from the forward phase cut dimmer requirement.
7. Update 'integrated lighting' phrase in Section 150.0(k)2G to be 'lighting integrated into'.
8. Restructure Section 150.0(k)3 to provide three discrete options.
    a. Photocell and motion sensor, OR
    b. Photocell and automatic time switch control, OR
    c. Astronomical time clock control
9. Separate EMCS language in the outdoor section as a new section, Section 150.0(k)3C, and align it with changes recommended for indoor EMCS language.
10. Update the JA8 marking section to include information on the compliance of previous code cycle markings (from Blueprint).

Multifamily Buildings

The *Multifamily Buildings* subcommittee recommends the following action items to simplify the 2022 Energy Code.

1. Update Table 180.2-E,
    a. Demand Responsive Controls row does not omit Section 110.12(b) for DR Zonal HVAC Controls like Table 141.0-F. Update if this was an omission.
    b. Automatic Shut Off Controls, Section 160.5(b)4Cvi does not list exception for 160.5(b)4Cvib like Table 141.0-F. Update if this was an omission.
2. Align Multifamily Buildings requirements to include applicable recommended updates for the nonresidential and residential lighting sections.

Lighting Definitions

The *Lighting Definitions* subcommittee recommends the following action items to simplify and clarify the 2022 Energy Code.

1. Add reference standards from the Residential lighting section,
    a. LED light sources: IES LM 79.
    b. High-intensity discharge lamps: IES LM-51.
2. Indent 'Lighting Definitions' to align with the formatting of other categories in the definition section.
3. Update annunciated definition to include "and/or auditory" signaling to align with its use in the Fire Alarm and Security industries.
4. Update the 'General Lighting' definition to remove the term 'uniform level' and align with simplified uniformity language recommendations in Section 130.1(b).
5. Update the 'healthcare facilities' definition throughout to align with the Department of Health Care Access and Information definition.
6. Update the 'multilevel lighting' definition to align with 2025 updates.

Compliance Manual

The *Compliance Manual* subcommittee recommends the following action items to simplify and clarify the language of the 2022 Energy Code.

1. Provide Control Interactions requirements as a new table. Expand on the purpose of the Control Interactions section to help explain how it differs from 110.9 and 130.1(a) through 130.1(e). Add explanations between the control strategies, with specific information provided to help define the relationship better between dimming and daylighting control requirements.
2. Add a link and reference to the Compliance Manual in the Energy Code document as part of the introduction (after the cover page).
3. Rename and rebrand the Compliance Manual to communicate its purpose, such as the "Energy Code Reference Guide".
4. Add more images to help describe requirements.
5. Add discussion of demand-responsive controls for controlled receptacles,
    a. There is the possibility of controlled receptacles being required in areas that are exempt from lighting ADR presenting the potential for undue burden of cost.
    b. Areas in question are based on 2022 Section 130.1(b) language and include:
        i. Non-general lighting
        ii. Rooms less than 100 SF

iii. Rooms with one (1) or two (2) lamps OR one (1) inseparable SSL luminaire

iv. Restrooms

Appendix 1: Redline 2022 Title 24 Lighting Language

Nonresidential Mandatory Requirements

Manual Area Controls

(a) Manual ~~Area~~ Control~~s~~.

Each enclosed space ~~area enclosed by ceiling-height partitions~~ shall provide lighting control(s) that allow the lighting in that enclosed space~~area~~ to be manually turned on and off. The manual control shall:

1. Be readily accessible to occupants of the enclosed space; and

EXCEPTION to Section 130.1(a)1: Restrooms having two or more stalls, parking areas, stairwells, corridors, and areas of the building intended for access or use by the public may use a manual control not accessible to unauthorized personnel.

2. Be located in the enclosed space OR be located such that the controlled lighting/visual display can be seen when operating the controls.

~~Be located in the same enclosed area with the lighting it controls; and~~

~~**EXCEPTION 1 to Section 130.1(a)2:** For malls and atria, main entry lobbies, auditorium areas, dining areas, retail merchandise sales areas, wholesale showroom areas, commercial and industrial storage areas, general commercial and industrial work areas, convention centers, arenas, psychiatric and secure areas in healthcare facilities, and other areas where placement of a manual area control poses a health and safety hazard, the manual area control may instead be located so that a person using the control can see the lights or area controlled by that control, or visually signal or display showing the current state of the controlled lighting.~~

EXCEPTION ~~2~~ to Section 130.1(a)2: Healthcare facilities~~, for restrooms and bathing rooms intended for a single occupant, the lighting control may be located outside the enclosed area but directly adjacent to the door~~.

3. Provide separate control of general, floor display, wall display, window display, case display, ornamental, and special effects lighting, such that

each type of lighting can be turned on or off without turning on or off other types of lighting, Scene controllers may comply with this requirement provided that at least one scene turns on general lighting only, and the control provides a means to manually turn off all lighting.

EXCEPTION to Section 130.1(a): Up to 0.1 watts per square foot of indoor lighting may be continuously illuminated to allow for means of egress illumination consistent with California Building Code Section 1008. Egress lighting complying with this wattage limitation is not required to comply with manual ~~area~~ control requirements if:

1. The area is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1; and

2. The controls for the egress lighting are not accessible to unauthorized personnel.

Multilevel Lighting Control~~s~~s

The general lighting of any enclosed space~~area~~ 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot shall provide multilevel lighting controls that allow the level of lighting to be adjusted up and down and ~~.~~ ~~M~~maintain illuminance uniformity by providing continuous dimming from 10-100 percent power. ~~Uniformity of illuminance shall not be reduced by multilevel lighting controls.~~ ~~The multilevel controls shall :~~

~~1. Pp~~rovide the number of control steps specified in TABLE 130.1-A.~~; and~~

~~**EXCEPTION 1 to Section 130.1(b)1:** Classrooms with a connected general lighting load of 0.6 watts per square feet or less shall have a minimum of one control step between 30-70 percent of full rated power, regardless of luminaire type.~~

~~2. Meet the uniformity requirements specified in TABLE 130.1-A.~~

EXCEPTION 1 to Section 130.1(b): An enclosed space ~~area enclosed by ceiling height partitions~~ that has only one luminaire ~~with no more than two lamps or has only one inseparable SSL luminaire~~.
EXCEPTION 2 to Section 130.1(b): Restrooms.
EXCEPTION 3 to Section 130.1(b): Healthcare facilities.

TABLE 130.1-A MULTILEVEL LIGHTING CONTROLS AND UNIFORMITY REQUIREMENTS

Luminaire Type	Minimum Required Control Steps (percent of full rated power[1])	Uniform level of illuminance shall be achieved by:
LED luminaires and LED light source systems	Continuous dimming 10-100 percent	Continuous dimming 10-100 percent
Line voltage sockets except GU-24	Continuous dimming 10-100 percent	Continuous dimming 10-100 percent
Low voltage incandescent systems	Continuous dimming 10-100 percent	Continuous dimming 10-100 percent
Fluorescent luminaires	Continuous dimming 20-100 percent	Continuous dimming 20-100 percent
GU-24 sockets rated for fluorescent ≤ 20 watts; Pin-based compact fluorescent ≤ 20 watts[2] Linear fluorescent and U-bent fluorescent ≤ 13 watts	Minimum one step between 30-70 percent	Continuous dimming; or Stepped dimming; or Switching alternate lamps in a luminaire.
Track Lighting	Minimum one step between 30-70 percent	Continuous dimming; or Stepped dimming; or Separately switching circuits in multi-circuit track with a minimum of two circuits.

~~Linear fluorescent and U-bent fluorescent > 13 watts~~	~~Minimum one step in each range:~~ ~~20 – 40 percent~~ ~~50 – 70 percent~~ ~~75 – 85 percent~~ ~~100 percent~~	~~Stepped dimming; or~~ ~~Continuous dimming; or~~ ~~Switching alternate lamps in each luminaire, having a minimum of 4 lamps per luminaire illuminating the same area and in the same manner~~
~~Other light sources, including HID and Induction~~	~~Minimum one step between~~ ~~50 – 70 percent~~	~~Stepped dimming; or~~ ~~Continuous dimming; or~~ ~~Switching alternate lamps in each luminaire, having a minimum of 2 lamps per luminaire, illuminating the same area and in the same manner.~~

~~1. Full rated input power of driver, ballast and lamp, corresponding to maximum ballast factor~~
~~2. Includes only pin-based lamps: twin tube, multiple twin tube, and spiral lamps~~

Shut-OFF 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.

EXCEPTION 1 to Section 130.1(c): Healthcare facilities.

EXCEPTION 2 to Section 130.1(c)~~1~~: Up to 0.1 watts per square foot of lighting in any area within a building may be continuously illuminated, provided that the area is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1. Lighting providing means of egress illumination, as the term is used in the California Building Code, shall be configured to provide no less than the amount of light required by California Building Code Section 1008 while in the partial-off mode.

1. ~~In addition to lighting controls installed to comply with Sections 130.1(a) and (b),~~ All installed indoor lighting shall be equipped with controls that meet the following requirements:

A. Shall be controlled with an occupant sensing control set to no more than a 20 minute time delay, automatic time-switch control, or other control capable of automatically shutting OFF all of the lighting when the space is typically unoccupied; and

B. Separate controls for the lighting on each floor, other than lighting in stairwells; and

C. Separate control~~s~~ zones for a space enclosed by ceiling height partitions shall not exceed~~exceeding~~ 5,000 square feet.

EXCEPTION to Section 130.1(c)1C: The area controlled may not exceed 20,000 square feet in the following function areas: Malls, auditoriums, single tenant retail, industrial, convention centers, and arenas~~;~~.

EXCEPTION 1 to Section 130.1(c)1: Where the lighting is serving an area that is in continuous use, 24 hours per day/365 days per year.

EXCEPTION 2 to Section 130.1(c)1: Lighting complying with Section 130.1(c)5 or 7.

~~**EXCEPTION 3 to Section 130.1(c)1:** Up to 0.1 watts per square foot of lighting in any area within a building may be continuously illuminated, provided that the area is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1. Lighting providing means of egress illumination, as the term is used in the California Building Code, shall be configured to provide no less than the amount of light required by California Building Code Section 1008 while in the partial-off mode.~~

EXCEPTION ~~3~~4 to Section 130.1(c)1: Electrical equipment rooms subject to Article 110.26(D) of the California Electrical Code.

EXCEPTION ~~4~~5 to Section 130.1(c)1: Illumination provided by lighting equipment that ~~is designated for emergency lighting, connected to an emergency power source or battery supply, and~~ is intended to function in emergency mode only when normal power is absent.

2. Countdown timer switches may be used to comply with the automatic shut-OFF…

…control requirements in Section 130.1(c)1 only in closets less than 70 square feet, and server aisles in server rooms. The maximum timer setting shall be 10 minutes for closets, and 30 minutes for server aisles.

3. If an automatic time-switch control~~,~~…

… ~~other than an occupant sensing control,~~ is installed to comply with Section 130.1(c)1, it shall incorporate a manual override lighting control that~~:~~

~~A. Complies with Section 130.1(a); and~~

~~B. A~~allows the lighting to remain ON for no more than 2 hours when an override is initiated.

EXCEPTION 1 to Section 130.1(c)3: Areas where occupancy sensing controls are installed.

EXCEPTION 2 to Section 130.1(c)3~~B~~: In the following function areas, the override time may exceed 2 hours: Malls, auditoriums, single tenant retail, industrial, laboratories and arenas where captive-key override is utilized.

4. If an automatic time-switch control~~,~~…

~~… other than an occupant sensing control,~~ is installed to comply with Section 130.1(c)1, it shall incorporate an automatic holiday "shut-OFF" feature that turns OFF all loads for at least 24 hours, and then resumes the normally scheduled operation.

EXCEPTION 1 to Section 130.1(c)4: Areas where occupancy sensing controls are installed.

EXCEPTION 2 to Section 130.1(c)4: Holiday shut-OFF controls are not required ~~I~~in retail stores~~ and associated~~, malls, restaurants, grocery stores, churches, and theaters,~~ the automatic time-switch control is not required to incorporate an automatic holiday shut-OFF feature~~.

5. Areas requiring an Occupant Sensing Control~~s~~ whether or not a time-switch control is installed: ~~are required for specified offices, multipurpose rooms, classrooms, conference rooms and restrooms.~~

In offices 250 square feet or smaller, multipurpose rooms of less than 1,000 square feet, classrooms of any size, conference rooms of any size, and restrooms of any size, lighting shall be controlled with occupant sensing controls to automatically shut OFF all of the lighting in 20 minutes or less after the ~~control zone~~space is unoccupied.

~~In areas required by Section 130.1(b) to have multilevel lighting controls,~~ T~~t~~he occupant sensing controls shall function either as a:

A. Partial-ON Occupant Sensing Control~~s~~ capable of automatically activating between 50-70 percent of controlled lighting power, or

B. Vacancy Sensing Control~~s~~, where all lighting responds to a manual ON input only.

~~In areas not required by Section 130.1(b) to have multilevel lighting controls, the occupant sensing controls shall function either as a:~~

~~A. Occupant Sensing Controls; or~~

~~B. Partial-ON Occupant Sensing Controls, or~~

~~C. Vacancy Sensing Controls, where all lighting responds to a manual ON input only.~~

In addition, controls shall be provided that allow the lights to be manually shut-OFF in accordance with Section 130.1(a) regardless of the sensor status.

Exception to 130.1(c)5: Lighting in restrooms shall be permitted to be controlled with full-on/full-off occupant sensing controls.

6. Full or Partial OFF occupant sensing controls are required for ~~aisle~~warehouse aisle ways ~~and~~ warehouse open areas, ~~in warehouses, library book stack aisles,~~ corridors ~~and~~ stairwells, and offices greater than 250 square feet.

Lighting installed in the following areas shall meet the requirements below ~~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 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 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.~~

~~C~~B. In corridors and stairwells (including library stack aisles 10 feet or more), lighting shall be controlled by occupant sensing controls that separately reduce the lighting power 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 from all designed paths of egress.

C~~D~~. In office spaces greater than 250 square feet, general lighting shall be controlled with occupant sensing controls that meet all of the following:

i. The occupant sensing controls shall be configured so that lighting shall be controlled separately in control zones not greater than 600 square feet. All control zones in offices greater than 250 square feet shall be shown on the plans. ~~For luminaires with an embedded occupant sensor that are capable of reducing power independently from other luminaires, each luminaire can be considered its own control zone~~; and

ii. In 20 minutes or less after the control zone is unoccupied, the occupant sensing controls shall uniformly reduce lighting power in the control zone to by at least 80 percent of full power. Control functions that switch control zone lights completely off when the zone is vacant meet this requirement; and

iii. In 20 minutes or less after the entire office space is unoccupied, the occupant sensing controls shall automatically turn off lighting in all control zones in the space; and

iv. In each control zone, lighting shall be allowed to automatically turn on to any level up to full power upon occupancy within the control zone. When occupancy is detected in any control zone in the space, the

lighting in other control zones that are unoccupied shall operate at no more than 20 percent of full power.

EXCEPTION to Section 130.1(c)6D: Under shelf or furniture mounted task lighting controlled by a local switch and either a time switch or an occupancy sensor.

7. **Partial OFF occupant sensing controls.**

Partial OFF occupant sensing controls are required for specified stairwells and common area corridors, parking garages, parking areas and loading and unloading areas. Lighting installed in the following areas shall meet the requirements below instead of complying with Section 130.1(c)1.

A. Lighting in stairwells and common area corridors that provide access to guest rooms of hotel/motels shall be controlled with occupant sensing controls that automatically reduce lighting power 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 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. **Parking Garage Controls**

In parking garages, parking areas and loading and unloading areas, general lighting shall be controlled by occupant sensing controls having at least one control step between 20 percent and 50 percent of design lighting power. No more than 500 watts of rated lighting power shall be controlled together as a single zone. A reasonably uniform level of illuminance shall be achieved in accordance with the applicable requirements in TABLE 130.1-A. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space, andspace and shall be automatically activated from all designed paths of egress.

Interior areas of parking garages are classified as indoor lighting for compliance with Section 130.1(c)7B. Parking areas on the roof of a parking structure are classified as outdoor hardscape and shall comply with the applicable provisions in Section 130.2.

EXCEPTION to Section 130.1(c)7B: Metal halide luminaires with a lamp plus ballast mean system efficacy of greater than 75 lumens per

~~watt, used for general lighting in parking garages, parking areas and loading and unloading areas, shall be controlled by occupant sensing controls having at least one control step between 20 percent and 60 percent of design lighting power.~~

8. Hotel motel guest rooms…

…shall be controlled with one of the following such that, no longer than 20 minutes after the guest room has been vacated, lighting power is switched off

i. captive card key controls; or

ii. occupant sensing controls; or

iii. other automatic controls.

EXCEPTION to Section 130.1(c)8: One high efficacy luminaire as defined in TABLE 150.0-A that is switched separately and where the switch is located within 6 feet of the entry door.

Automatic Daylighting Controls

(d) Daylight Responsive Controls~~Automatic Daylighting Controls~~.

Any~~The~~ general lighting luminaire that is at least 50 percent in skylit daylit zones, primary sidelit daylit zones, or~~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. 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.

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 zonesareas.~~

2. The daylight responsive~~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 and other solid state lighting (SSL) light sources in linear form may be treated as linear lamps in increments of four~~4~~ feet segments or smaller, and each segment is separately controlled based on the type of the daylit zone the segment is primarily located.

3. The daylight responsive ~~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 and allow the multilevel lighting control to adjust the level of lighting;

   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 daylit zones shall be turned off~~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.

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): Areas~~Rooms~~ where the combined total installed wattage of the general lighting located at least 50 percent in the skylit daylight zone, ~~and~~ primary sidelit daylit zone~~s~~, or secondary sidelit daylight zone 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 daylight responsive ~~automatic daylighting~~ controls ~~in the daylit zones~~.

EXCEPTION 5 to Section 130.1(d): Areas~~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 6 to Section 130.1(d): For parking garages, luminaires located in the daylight adaptation zone.

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

Demand Responsive Controls

130.1(~~e)~~ e) Demand Responsive Controls.

See Section 110.12 for requirements for demand responsive lighting controls.

SECTION 110.12 – MANDATORY REQUIREMENTS FOR DEMAND MANAGEMENT

Buildings, other than healthcare facilities, that install or are required to install demand responsive controls shall comply with the applicable demand responsive control requirements of Sections 110.12(a) through 110.12(e).

(a) Demand responsive controls.

1. All demand responsive controls shall be either:

   A. A certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node (VEN), as specified under Clause 11, Conformance, in the applicable OpenADR 2.0 Specification; or

   B. Certified by the manufacturer as being capable of responding to a demand response signal from a certified OpenADR 2.0b Virtual End Node by automatically implementing the control functions requested by the Virtual End Node for the equipment it controls.

2. All demand responsive controls shall be capable of communicating with the VEN using a wired or wireless bi-directional communication protocol~~pathway~~.

3. RESERVED

4. When the demand response signal is ~~communications are~~ disabled or unavailable, all demand responsive controls shall continue to perform all other control functions provided by the demand responsive control.

5. Demand responsive control thermostats shall comply with Reference Joint Appendix 5 (JA5), Technical Specifications For Occupant Controlled Smart Thermostats.

(b) Demand Responsive Zonal HVAC Controls.

Nonresidential HVAC systems with DDC to the Zone level shall be programmed to allow centralized demand shed for noncritical zones as follows:

1. The controls shall have a capability to remotely increase the operating cooling temperature set points by 4° or more in all noncritical zones on signal from a centralized contact or software point within an Energy Management Control System (EMCS).

2. The controls shall have a capability to remotely decrease the operating heating temperature set points by 4° or more in all noncritical zones on signal from a centralized contact or software point within an EMCS.

3. The controls shall have capabilities to remotely reset the temperatures in all noncritical zones to original operating levels on signal from a centralized contact or software point within an EMCS.

4. The controls shall be programmed to provide an adjustable rate of change for the temperature increase, decrease, and reset.

5. The controls shall have the following features:

A. Disabled. Disabled by authorized facility operators; and

B. Manual control. Manual control by authorized facility operators to allow adjustment of heating and cooling set points globally from a single point in the EMCS; and

C. Automatic Demand Shed Control. Upon receipt of a demand response signal, the space-conditioning systems shall conduct a centralized demand shed, as specified in Sections 110.12(b)1 and 110.12(b)2, for noncritical zones during the demand response period.

(c) Demand Responsive Lighting Controls

Buildings with nonresidential lighting systems having a total installed lighting power of 4,000 watts or greater that is subject to the requirements of Section 130.1(b) shall install controls that are capable of automatically reducing lighting power in response to a Demand Response Signal.

1. For compliance testing, the lighting controls shall demonstrate a 15 percent or greater reduction in lighting ~~power as~~power as described in NA7.6.3. ~~The controls may provide additional demand responsive functions or abilities.~~

2. For buildings where demand response controls are required, demand responsive controls shall control the general lighting in the spaces required to meet ~~that is subject to the requirements of~~ Section 130.1(b) ~~and may control additional lighting~~.

3. General lighting shall be reduced in a manner consistent with the uniform level of illumination requirements in TABLE 130.1-A.

EXCEPTION to 110.12(c): Spaces where a health or life safety statute, ordinance, or regulation does not permit the general lighting to be reduced are not required to install demand responsive controls and do not count toward the 4,000 watt threshold.

(d) Demand Responsive Electronic Message Center Control.

Controls for electronic message centers greater than 15 kW shall be capable of reducing the lighting power by a minimum of 30 percent when receiving a demand response signal.

EXCEPTION to Section 110.12(d): Electronic message centers that are not permitted by a health or life safety statute, ordinance, or regulation to be reduced.

(e) Demand Responsive Controlled Receptacles.

Controlled receptacles in buildings shall be capable of automatically turning off all loads connected to the receptacle in response to a demand response signal.

Exception 1 to 110.12(e): Spaces without~~Buildings not required to have~~ demand responsive lighting controls.

Exception 2 to 110.12(e): Spaces where a health or life safety statute, ordinance, or regulation does not permit the receptacles to be automatically controlled.

Control Interactions

(f) Control Interactions.

Each lighting control installed to comply with Section 130.1(a) through (e) shall permit or incorporate the functions of the other lighting controls per the following requirements which are summarized in Table 130.1-B.~~.~~

1. For general lighting, the manual area control (Section 130.1(a)) shall permit the ~~level or amount of~~ light level to be ~~provided while the lighting is on to be set or~~ adjusted by the ~~controls specified in~~ multilevel controls (Section 130.1(b)), shutoff controls (Section 130.1(c)), daylight responsive controls (Section 130.1(d)), and demand responsive controls (Section 130.1(e)).

2. The manual area controls (Section 130.l(a)) shall permit the shutoff controls (Section 130.1(c)) to adjust the light level~~turn the lighting down or off~~.

3. The multilevel lighting control (Section 130.1(b)) shall permit the daylight responsive ~~automatic daylighting~~ controls (Section 130.1(d)) to adjust the electric lighting level in response to changes in the amount of daylight in the daylit zone.

4. The multilevel lighting control (Section 130.1(b)) shall permit the demand responsive controls (Section 130.1(e)) to adjust the lighting during a demand response event and to return it to the level set by the multilevel lighting control after the event.

5. The shutoff control (Section 130.1(c)) shall permit the manual area control (Section 130.1(a)) to turn the lighting on. If the on request occurs while an automatic time switch control would turn the lighting off, then the on request shall be treated as an override request consistent with Section 130.1(c)3.

6. The daylight responsive ~~automatic daylighting~~ controls (Section 130.1(d)) shall permit the multilevel lighting controls (Section 130.1(b)) to override~~adjust~~ the light level~~level of lighting~~.

7. For lighting controlled by multilevel lighting controls (Section 130.1(b))and by occupant sensing controls that provide an automatic-on function (Section 130.1(c)6 and Section 130.1(c)7), the controls shall provide a partial-on function that is capable of automatically activating between 50-70 percent of controlled lighting power.

Exception to 130.1(f)7: Office areas greater than 250 square feet can be dimmed to any power level..

8. RESERVED

9. For space conditioning system zones serving only spaces that are required to have occupant sensing controls as specified in Section 130.1(c)5, 6 and 7, and where Table 120.1-A allows the ventilation air to be reduced to zero when the space is in occupied-standby mode, the space conditioning system shall be controlled by occupancy sensing controls as specified in Section 120.2(e)3.

TABLE 130.1-B: Control Interactions Requirements

If using (down) …then allow (right) to override light level.	Manual Controls	Multilevel Lighting Controls	Shutoff Controls	Daylight Responsive Controls	Demand Responsive Controls
Manual Controls		Yes, dim only.	Yes, dim or off.	Yes, in response to daylight levels in daylight zone.	Yes, during DR event only.
Multilevel Lighting Controls				Yes, in response to daylight levels in daylight zone.	Yes, during DR event only.
Shutoff Controls	Yes				
Daylight Responsive Controls		Yes, dim only.			
Demand Responsive Controls					
Multilevel Lighting Controls & Partial-On Occupancy Sensors		Yes, dim to 50-70 percent.	Yes, dim to 50-70 percent.		

Outdoor Lighting

(b) Luminaire Shielding Requirements.

All outdoor luminaires of 6,200 initial luminaire lumens or greater, shall comply with Backlight, Uplight, and Glare (BUG) in accordance with ANSI/IES TM-15-20, Annex A requirements ~~in accordance with Title 24, Part 11, Section 5.106.8~~ in accordance with Table 130.2-A.

TABLE 130.2-A MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT, AND GLARE (BUG) RATINGS

TABLE 5.106.8 [N] MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS[1,2]

ALLOWABLE RATING	LIGHTING ZONE LZ0	LIGHTING ZONE LZ1	LIGHTING ZONE LZ2	LIGHTING ZONE LZ3	LIGHTING ZONE LZ4
Maximum Allowable Backlight Rating (B)					
Luminaire greater than 2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	N/A	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	N/A	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	B0	B0	B1	B2
Maximum Allowable Uplight Rating (U)					
For area lighting[3]	N/A	U0	U0	U0	U0
For all other outdoor lighting, including decorative luminaires	N/A	U1	U2	U3	U4
Maximum Allowable Glare Rating (G)					
Luminaire greater than 2 MH from property line	N/A	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	N/A	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	N/A	G0	G0	G1	G1
Luminaire front hemisphere is less than 0.5 MH from property line	N/A	G0	G0	G0	G1

1. IESNA Lighting Zones 0 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.
2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.
3. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet *U*-value limits for "all other outdoor lighting."

EXCEPTION 1 to Section 130.2(b): Signs.

EXCEPTION 2 to Section 130.2(b): Lighting for building facades, public monuments, public art, statues, and vertical surfaces of bridges.

EXCEPTION 3 to Section 130.2(b): Lighting not permitted by a health or life safety statute, ordinance, or regulation to be a cutoff luminaire.

EXCEPTION 4 to Section 130.2(b): Temporary outdoor lighting**.**

EXCEPTION 5 to Section 130.2(b): Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:

A. Where the existing luminaire does not meet the luminaire BUG requirements in Section 130.2(b); and

B. Spacing between existing poles is greater than six times the mounting height of the existing luminaires; and

C. Where no additional poles are being added to the site; and

D. Where new wiring to the luminaires is not being installed; and

E. Provided that the connected lighting power wattage is not increased.

EXCEPTION 6 to Section 130.2(b): Luminaires that illuminate the public right of way ~~on~~ including publicly--maintained or utility-maintained roadways, sidewalks, and bikeways.

EXCEPTION 7 to Section 130.2(b): Outdoor lighting attached to a hotel/motel building and separately controlled from the inside of a guest room.

(c) Controls for Outdoor Lighting.

Outdoor lighting shall be independently controlled from other electrical loads, and the controls for outdoor lighting shall meet the following functional requirements:

EXCEPTION 1 to Section 130.2(c): Outdoor lighting not permitted by a health or life safety statute, ordinance, or regulation to be turned OFF or reduced.

EXCEPTION 2 to Section 130.2(c): Lighting in tunnels required to be illuminated 24 hours per day and 365 days per year.

1. **Daylight Availability.** All installed outdoor lighting shall be controlled by a photo control, astronomical time-switch control, or other control capable of automatically shutting OFF the outdoor lighting when daylight is available.

2. **Automatic Scheduling Controls.**

   A. Automatic scheduling controls shall be installed for all outdoor lighting. Automatic Scheduling Controls may be installed in combination with motion sensing controls or other outdoor lighting controls.

   B. Automatic scheduling controls shall be capable of reducing the outdoor lighting power by at least 50 percent ~~and no more than 90 percent~~, and separately capable of turning the lighting OFF, during scheduled unoccupied periods.

   C. Automatic scheduling controls shall allow scheduling of a minimum of two nighttime periods with independent lighting ~~levels, and~~levels and may include an override function that turns lighting ON during its scheduled dim or OFF state for no more than two hours when an override is initiated.

3. **Motion Sensing Controls.**

   A. Motion sensing controls shall be installed for the following luminaires where the bottom of the luminaire is mounted 24 feet above grade or

lower:. ~~Motion sensing controls may be installed for other outdoor lighting and in combination with other outdoor lighting controls.~~

i. Outdoor luminaires ~~other than those~~ providing general lighting for general hardscape, Outdoor Sales Lot, Vehicle Service Station Canopies, and Vehicle Service Station Hardscape applications~~Building Façade, Ornamental Hardscape, Outdoor Dining, or Outdoor Sales Frontage lighting, where the bottom of luminaire is mounted 24 feet above grade or lower~~; and,

ii. Wall packs ~~Bilaterally symmetric outdoor wall mounted luminaires (typically referred to as "wall packs")~~ (bilaterally symmetric outdoor wall mounted luminaire) providing general lighting for Building Façade, Ornamental Hardscape or Outdoor Dining ~~lighting that are mounted 24 feet above grade or lower~~.

B. Motion sensing controls shall be capable of reducing the outdoor lighting power of each controlled luminaire by at least 50 percent ~~and no more than 90 percent, and separately capable of turning the luminaire OFF, during unoccupied periods~~ after the area has been vacated.

C. Motion sensing controls shall be capable of reducing the lighting to its dim or OFF state no longer than 15 minutes after the area has been vacated, and of returning the lighting to its ON state when the area becomes occupied.

D. No more than 1,500 watts of lighting power shall be controlled by a single sensor or as a single zone.

EXCEPTION 1 to Section 130.2(c)3: Luminaires with a maximum rated wattage of 40 watts each are not required to have motion sensing controls.

EXCEPTION 2 to Section 130.2(c)3: Luminaires providing lighting for the following applications~~Applications listed as Exceptions to Section 140.7(a)~~ are not required to have motion sensing controls~~.~~:

A. Outdoor Sales Frontage applications

B. Applications listed as Exceptions to Section 140.7(a)

EXCEPTION 3 to Section 130.2(c)3: Lighting subject to a health or life safety statute, ordinance, or regulation may have a minimum time-out period longer than 15 minutes or a minimum dimming level above 50 percent when necessary to comply with the applicable law.

Controlled Environment Horticulture Lighting

TABLE 100.0-A APPLICATION OF STANDARDS

Occupancies	Application	Mandatory	Prescriptive	Performance	Additions/Alterations
All Buildings	General	100.0, 100.1, 100.2, 110.0	100.0, 100.1, 100.2, 110.0	100.0, 100.1, 100.2, 110.0	100.0, 100.1, 100.2, 110.0
Nonresidential, And Hotels/Motels	General	120.0	140.0, 140.2	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Envelope (conditioned)	110.6, 110.7, 110.8,120.7	140.3	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Envelope (unconditioned process spaces)	N.A.	140.3(c)	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	HVAC (conditioned)	110.2, 110.5, 120.1, 120.2, 120.3, 120.4, 120.5, 120.8	140.4	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Water Heating	110.3, 120.3, 120.8, 120.9	140.5	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Indoor Lighting (conditioned, process spaces)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Indoor Lighting (unconditioned and parking garages)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6	N.A.	141.0
Nonresidential, And Hotels/Motels	Outdoor Lighting	110.9, 130.0, 130.2, 130.4	140.7	N.A.	141.0
Nonresidential, And Hotels/Motels	Electrical Power Distribution	110.11, 130.5	N.A.	N.A.	141.0
Nonresidential, And Hotels/Motels	Pool and Spa Systems	110.4, 110.5, 150.0(p)	N. A.	N.A.	141.0
Nonresidential, And Hotels/Motels	Solar Ready Buildings	110.10	N.A.	N.A.	141.0(a)
Nonresidential, And Hotels/Motels	Solar PV and Battery Storage Systems	N.A.	140.10	140.0, 140.1	N.A.
Covered Processes[1]	Controlled Environment Horticulture, ~~Envelope~~, Ventilation, Process Loads	110.2, 120.6	140.9	140.1	120.6, 140.9, 141.1
Signs	Indoor and Outdoor	110.9, 130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H
Single-Family	General	150.0	150.1(a, c)	150.1(a), 150.1(b)	150.2(a), 150.2(b)
Single-Family	Envelope (conditioned)	110.6, 110.7, 110.8, 150(a), 150.0(b), 150.0(c), 150.0(d), 150.0(e), 150.0(g), 150.0(q)	150.1(a, c)	150.1(a), 150.1(b)	150.2(a), 150.2(b)

120.6(h) Mandatory Requirements for Controlled Environment Horticulture (CEH) Spaces

1. **Indoor Growing, Dehumidification.** Dehumidification equipment shall be one of the following:

   A. Dehumidifiers subject to regulation under federal appliance standards tested in accordance with 10 CFR 430.23(z) and Appendix X or X1 to Subpart B of 10 CFR Part 430 as applicable, and complying with 10 CFR 430.32(v)2;

   B. Integrated HVAC system with on-site heat recovery designed to fulfill at least 75 percent of the annual energy for dehumidification reheat;

   C. Chilled water system with on-site heat recovery designed to fulfill at least 75 percent of the annual energy for dehumidification reheat; or

   D. Solid or liquid desiccant dehumidification system for system designs that require dewpoint of 50°F or less.

~~2. **Indoor Growing, Horticultural Lighting.** In a building with CEH spaces and with more than 40 kW of aggregate horticultural lighting load, the electric lighting systems used for plant growth and plant maintenance shall meet the all of the following requirements:~~

~~A. The horticultural lighting systems shall have a photosynthetic photon efficacy (PPE) rated in accordance with ANSI/ASABE S640 for wavelengths from 400 to 700 nanometers and meet one of the following requirements:~~

~~i. Integrated, non-serviceable luminaires shall have a rated PPE of at least 1.9 micromoles per joule; or~~

~~ii. Luminaires with removable or serviceable lamps shall have lamps with a rated PPE of at least 1.9 micromoles per joule.~~

~~B. Time-switch lighting controls shall be installed and comply with Section 110.9(b)1, Section 130.4(a)4, and applicable sections of NA7.6.2.~~

~~C. Multilevel lighting controls shall be installed and comply with Section 130.1(b).~~

~~2~~3. **Indoor Growing, Electrical Power Distribution Systems.** Electrical power distribution system serving CEH spaces shall be designed so that a measurement

device is capable of monitoring the electrical energy usage of aggregate horticultural lighting load.

34. Indoor Growing and Greenhouses, Horticultural Lighting. In a building with CEH spaces or in a greenhouse with more than 40 kW of aggregate horticultural lighting load, the electric lighting system used for plant growth and plant maintenance shall meet the following requirements:

A. The horticultural lighting systems shall have a photosynthetic photon efficacy (PPE) rated in accordance with ANSI/ASABE S640 for wavelengths from 400 to 700 nanometers and meet one of the following requirements in Table 120.6-F.

TABLE 120.6-F: HORTICULTURE LIGHTING -- MINIMUM PPE REQUIREMENTS

Luminaire Type	PPE for Indoor Growing Applications (micromoles per joule)	PPE for Greenhouse Applications (micromoles per joule)
Luminaires, Integrated/Non-serviceable	1.9	1.7
Luminaires, Removable/Serviceable Lamps	1.9	1.7

B. Time-switch lighting controls shall be installed and comply with Section 110.9(b)1, Section 130.4(a)4, applicable sections of Reference Nonresidential Appendix NA7.6.2.

C. Multilevel lighting controls shall be installed and comply with Section 130.1(b).

4. **Conditioned Greenhouses, Building Envelope.** Conditioned greenhouses shall meet the following requirements:

A. Opaque wall and opaque roof assembly shall meet the requirements of Section 120.7; and

B. Non-opaque envelopes shall have two or more glazings separated by either air or gas fill.

5~~6~~. **Conditioned Greenhouses, Space-Conditioning Systems.** Space-conditioning systems used for plant production shall comply with all applicable requirements.

~~6. Indoor Growing and~~ **Greenhouses, Horticultural Lighting.** ~~In a building with CEH spaces or In a greenhouse with more than 40 kW of aggregate horticultural lighting load, the electric lighting system used for plant growth and plant maintenance shall meet the following requirements:~~

~~A. The horticultural lighting systems shall have a photosynthetic photon efficacy (PPE) rated in accordance with ANSI/ASABE S640 for wavelengths from 400 to 700 nanometers and meet one of the following requirements in Table 120.6-F.:~~

~~i. Integrated, non-serviceable luminaires shall have a rated PPE of at least 1.7 micromoles per joule; or~~

~~ii. Luminaires with removable or serviceable lamps shall have lamps with a rated PPE of at least 1.7 micromoles per joule.~~

~~B. Time-switch lighting controls shall be installed and comply with Section 110.9(b)1, Section 130.4(a)4, applicable sections of Reference Nonresidential Appendix NA7.6.2.~~

~~C. Multilevel lighting controls shall be installed and comply with Section 130.1(b).~~

141.1(c) Controlled Environment Horticulture Spaces.

1. Indoor Growing, Space-Conditioning Systems and Dehumidification. All newly installed heating, ventilation, air conditioning systems or dehumidification systems in buildings with indoor growing shall meet the applicable requirements of Section 120.6(h)1 and 120.6(h)2.

2. Greenhouses, Building Envelope and Space-Conditioning Systems. A greenhouse being converted to a conditioned greenhouse or additions to a conditioned greenhouse shall meet the requirements of Sections 120.6(h5 and 120.6(h)6.

3. Indoor Growing and Greenhouses, Horticultural Lighting. When alterations to horticultural lighting systems increase lighting wattage or include adding, replacing,

or altering 10 percent or more of the horticultural luminaires serving an enclosed space, the newly installed, replaced, or altered lighting shall meet the requirements of Section 120.6(h)3 for indoor growing or Section 120.6(h)7 for greenhouses.

EXCEPTION to Section 141.1(c)3: Any alteration limited to adding lighting controls or replacing lamps, ballasts, or drivers.

NOTE: For alterations that change the occupancy classification of the building, the requirements of Section 141.1 apply to the occupancy that will exist after the alterations.

Electrical Power Distribution

(d) Circuit Controls for 120-Volt Receptacles and Controlled Receptacles.

In all buildings, both controlled and uncontrolled 120 volt receptacles shall be provided in office areas, lobbies, conference rooms, kitchen areas in office spaces, and copy rooms. Additionally, hotel/motel guest rooms shall comply with Section 130.5(d)4. Plug-in strips and other plug-in devices shall not be used to comply.

Controlled receptacles shall meet the following requirements, as applicable:

1. Install a control capable of automatically shutting OFF the controlled receptacles when the space is typically unoccupied, either at the receptacle or circuit level. When an automatic time switch control is installed it shall incorporate an override control that allows the controlled receptacle to remain ON for no more than 2 hours when an override is initiated and an automatic holiday "shut-OFF" feature that turns OFF all loads for at least 24 hours and then resumes the normally scheduled operation. Countdown timer switches shall not be used to comply ~~with the automatic time switch control requirements~~; and

2. Install at least one controlled receptacle within 6 feet from each uncontrolled receptacle or install a multiple receptacle device ~~splitwired receptacle~~ with at least one controlled and one uncontrolled receptacle. Where receptacles are installed in modular furniture in open office areas, at least one controlled receptacle shall be installed at each workstation; and

3. Provide a permanent ~~and durable~~ marking for controlled receptacles or circuits to differentiate them from uncontrolled receptacles or circuits; and

4. For hotel and motel guest rooms, install controlled receptacles for at least one-half of the 120-volt receptacles in each guest room. Electric circuits serving controlled receptacles in guest rooms shall have captive card key controls, occupant sensing

controls, or automatic controls so the power is switched off no longer than 30 minutes after the guest room has been vacated.

~~**NOTE:** A hardwired power strip controlled by an occupant sensing control may be used to comply with Section 130.5(d). Plug-in strips and other plug-in devices shall not be used to comply with the requirements of Section 130.5(d).~~

EXCEPTION 1 to Section 130.5(d): Receptacles that are only for the following purposes:

i. Receptacles specifically for refrigerators and water dispensers in kitchen areas.

ii. Receptacles located a minimum of six feet above the floor that are specifically for clocks.

iii. Receptacles for network copiers, fax machines, A/V and data equipment other than personal computers in copy rooms.

iv. Receptacles on circuits rated more than 20 amperes.

v. Receptacles connected to an uninterruptible power supply (UPS) that are intended to be in continuous use, 24 hours per day/365 days per year, and are marked to differentiate them from other uncontrolled receptacles or circuits.

EXCEPTION 2 to Section 130.5(d): Receptacles in healthcare facilities.

Nonresidential Prescriptive Requirements

Sign Lighting

SECTION 140.8 – PRESCRIPTIVE REQUIREMENTS FOR SIGNS

This section applies to all internally illuminated and externally illuminated signs, unfiltered light emitting diodes (LEDs), and unfiltered neon, both indoor and outdoor. Each sign shall comply with either Subsection (a) or (b), as applicable.

(a) Maximum Allowed Lighting Power.

1. For internally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 12 watts per square foot. For double-faced signs, only the area of a single face shall be used to determine the allowed lighting power.

2. For externally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 2.3 watts per square foot. Only areas of an externally lighted sign that are illuminated without obstruction or interference, by one or more luminaires, shall be used.

3. Lighting for unfiltered light emitting diodes (LEDs) and unfiltered neon shall comply with Section 140.8(b).

(b) Alternate Lighting Sources

The sign shall be equipped with one or more of the following light sources:

~~1. High pressure sodium lamps; or~~

~~2. Metal halide lamps that are:~~

~~A. Pulse start or ceramic served by a ballast that has a minimum efficiency of 88 percent or greater; or~~

~~B. Pulse start that are 320 watts or smaller, are not 250 watt or 175 watt lamps, and are served by a ballast that has a minimum efficiency of 80 percent.~~

~~Ballast efficiency is the reference lamp power divided by the ballast input power when tested according to ANSI C82.6 2015.~~

31. Neon or cold cathode lamps with transformer or power supply efficiency greater than or equal to the following:

A. A minimum efficiency of 75 percent when the transformer or power supply rated output current is less than 50 mA; or

B. A minimum efficiency of 68 percent when the transformer or power supply rated output current is 50 mA or greater.

The ratio of the output wattage to the input wattage is at 100 percent tubing load.

24. ~~5~~. Light emitting diodes (LEDs) with a power supply having an efficiency of 80 percent or greater; or

EXCEPTION to Section 140.8(b)~~5~~2: Single voltage external power supplies that are designed to convert 120 volt AC input into lower voltage DC or AC output, and have a nameplate output power less than or equal to 250

watts, shall comply with the applicable requirements of the Appliance Efficiency Regulations (Title 20).

~~6. Compact fluorescent lamps that do not contain a medium screw base socket (E24/E26).~~

EXCEPTION 1 to Section 140.8: Unfiltered incandescent lamps that are not part of an electronic message center (EMC), an internally illuminated sign or an externally illuminated sign.

EXCEPTION 2 to Section 140.8: Exit signs. Exit signs shall meet the requirements of the Appliance Efficiency Regulations.

EXCEPTION 3 to Section 140.8: Traffic Signs. Traffic signs shall meet the requirements of the Appliance Efficiency Regulations.

Lighting Power Allowances

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

Three options were considered by the Allowance subcommittee and stakeholders. Stakeholders ranked Option 1 as most desirable.

Option 1: Remove the Tailored Method altogether and instead include additional allowances under Area Category Method for the following Function Areas that are currently using Tailored Method to some degree:

- Convention, Conference, Multipurpose and Meeting Area
- Bar/Lounge and Fine Dining Area
- Museum Area
- Main Entry Lobby
- Retail Sales Area (Merchandise Sales and Grocery)

Option 2: Remove the Tailored Method altogether and revise allowances under Area Category using IECC allowances for the following function areas:

- Auditorium Area
- Convention, Conference, Multipurpose and Meeting Area
- Bar/Lounge and Fine Dining Area
- Hotel Function Area
- Main Entry Lobby
- Museum Area

- Retail Merchandise Sales and Grocery
- Religious Worship Area
- Theater Area (Motion Picture and Performance)

Option 3: Simplify Tailored language in 140.6.

- Revise Table 140.6-D to remove unused Primary Function Areas and include General Lighting power allowances instead of Lux.
- Remove Table 140.6-E and include Mounting Height Adjustment Factors in S140.6(a)4C.
- Remove Table 140.6-F and include Room Cavity Ratio (RCR) calculation in S140.6(c)3Fi.
- Remove Table 140.6-G and get rid of Lux; General Lighting power allowance based on RCR included in Table 140.6-D.

Option 1: Remove Tailored Method and add Additional Allowances to Area Category

140.6(a)4. Luminaire Classification and Power Adjustment.

~~C. Tailored Method Display Lighting Mounting Height Lighting Power Adjustment. For wall-display luminaires or floor display luminaires meeting Tailored Method Section 140.6(c)3G and H and where the bottom of luminaires are 10 feet 7 inches and greater above the finished floor, the adjusted indoor lighting power of these luminaires shall be calculated by multiplying their maximum rated wattage and the appropriated mounting height adjustment factor from Table 140.6-E. Luminaire mounting height is the distance from the finished floor to the bottom of the luminaire. General lighting shall not qualify for a mounting height multiplier.~~

140.6(b) Calculation of Allowed Indoor Lighting Power: General Rules.

3. The allowed indoor lighting power density allotment for general lighting shall be calculated as follows:

~~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 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-D (or TABLE 140.6-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 TABLE 140.6-D (or TABLE 140.6-C if the Area Category Method is used for that area);~~

~~The allowed indoor lighting power 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 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 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; precision commercial and industrial work; white board or chalk board; accent, display and feature; decorative; valuable display case 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; decorative/special effect; or very valuable display case; may not be increased, or otherwise traded between any of the separate allotments.~~

140.6(c). Calculation of Allowed Indoor Lighting Power: Specific Methodologies.

The allowed indoor lighting power for each building type, or each primary function area shall be calculated using only one of the methods in Subsection 1~~, 2~~ or ~~3~~2 below as applicable.

2. Area Category Method.

G. In addition to the allowed indoor lighting power calculated according to Sections 140.6(c)2A through F, the building may add additional lighting power allowances for qualifying lighting systems as specified in the Qualifying Lighting Systems column in TABLE 140.6-C under the following conditions:

i. Only primary function areas having a lighting system as specified in the Qualifying Lighting Systems column in TABLE 140.6-C and in accordance with the corresponding footnote of the TABLE shall qualify for the additional lighting power allowances; 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

~~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.~~

~~B. Allowed Indoor Lighting Power allotments for general lighting shall be determined according to Section 140.6(c)3F, as applicable.~~

~~C. For compliance with Section 140.6(c)3, an "area" shall be defined as all contiguous areas that 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 allotments for general lighting calculated according to Sections 140.6(c)3F, as applicable, the building may add additional lighting power allowances for wall display lighting, floor display lighting and task lighting, decorative/special effects lighting, and very valuable display cases lighting according to Sections 140.6(c)3G through J.~~

~~F. Determine allowed indoor lighting power allotments for general lighting for primary function areas listed in TABLE 140.6-D as follows:~~

~~i. Use the General Illumination Level (Lux) listed in Column 2 of TABLE 140.6-D 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.

iii. Find the allowed General Lighting Power Density allotments in TABLE 140.6-G that is applicable to the General Illuminance Level (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.

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 allotment for general lighting for the area.

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

ii. 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 luminaires providing directional display light.)

iii. 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 within two feet of the ceiling or are taller than ten feet and (II) are permanently anchored to the floor.

iv. For wall display lighting where the bottom of the luminaire is greater than 10 feet 6 inches above the finished floor, the mounting height adjustment factor from Table 140.6-E can be used to adjust the installed luminaire wattage as specified in Section 140.6(a)4C.

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

a. the "wall display lighting power density" determined in accordance with TABLE 140.6-D, multiplied by the wall display lengths determined in accordance with Item iii; and

b. The Adjusted Indoor Lighting Power used for the wall display lighting systems.

vi. Lighting internal to display cases that are attached to a wall or directly adjacent to a wall are counted as wall display lighting as specified in Section 140.6(c)3G. All other lighting internal to display cases are counted as floor display lighting as specified in Section 140.6(c)3H, or as very valuable display case lighting as specified in Section 140.6(c)3J.

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

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

ii. Lighting internal to display cases that are not attached to a wall and not directly adjacent to a wall shall be counted as floor display lighting in accordance with Section 140.6(c)3H; or very valuable display case lighting in accordance with Section 140.6(c)3J.

iii. 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.

iv. Qualifying floor display lighting shall:

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

b. Consist of only (I) directional lamp types, such as PAR, R, MR, AR; or (II) luminaires providing directional display light.

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

v. 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.

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

vii. The square footage of floor displays 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.

viii. For floor display lighting where the bottom of the luminaire is greater than 10.6 feet above the finished floor, multiply the floor display installed watts by the appropriate mounting height adjustment factor from Table 140.6-E to calculate the Adjusted Indoor Lighting Power as specified in Section 140.6(a)1C.

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

a. The allowed floor display and task lighting power determined in accordance with Section 140.6(c)3Hvi multiplied by the floor square footage determined in accordance with Section 140.6(c)3Hvii; and

b. The Adjusted Indoor Lighting Power used for the floor display lighting systems.

I. Determine additional allowed power for decorative/special effects lighting as follows:

i. Qualifying decorative 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.

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

iii. Additional lighting power for decorative/special effects lighting shall be used only in areas having decorative/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 decorative/special effects lighting.

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

a. The product of the "allowed decorative/special effects lighting power" determined in accordance with Section 140.6(c)3Iii, multiplied by the floor square footage determined in accordance with Section 140.6(c)3Iiii; and

b. The Adjusted Indoor Lighting Power of allowed decorative/special effects lighting.

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

i. 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.

ii. 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.

iii. 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.

iv. If there is qualifying very valuable display case lighting, in accordance with Section 140.6(c)3Jii, 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 0.50 watt per square foot; or

b. The product of the area of the display case and 7 watts per square foot; or

c. The Adjusted Indoor Lighting Power of lighting for very valuable displays.

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

Primary Function Area		Allowed Lighting Power Density for General Lighting (W/ft²)	Additional Lighting Power	
			Qualified Lighting Systems	Additional Allowance (W/ft², unless noted otherwise)
Aging Eye/Low-vision[11]	Corridor Area	0.70	Decorative/Display	0.30
	Dining	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Lobby, Main Entry	0.85	Decorative/Display	0.30
			Transition Lighting OFF at night[12]	0.95
			Tunable white or dim-to-warm[10]	0.10
	Lounge/Waiting Area	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Multipurpose Room	0.85	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Religious Worship Area	1.00	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Restroom	1.00	Decorative/Display	0.20
	Stairwell	0.80	Decorative/Display	0.30
Audience Seating Area		0.50	Decorative/Display	0.25
Auditorium Area		0.70	Decorative/Display	0.45
Auto Repair / Maintenance Area		0.55	Detailed Task Work[7]	0.20

Barber, Beauty Salon, Spa Area		0.70	Detailed Task Work[7]	0.30
			Decorative/Display	0.25
Civic Meeting Place Area		0.90	Decorative/Display	0.25
Classroom, Lecture, Training, Vocational Area		0.60	White or Chalk Board[1]	7 W/ft
Concourse and Atria Area		0.60	Decorative/Display	0.25
Convention, Conference, Multipurpose and Meeting Area		0.75	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14'	0.25 2 W/ft 2.35 W/ft 2.66 W/ft 0.30 0.35 0.40
Copy Room		0.50	-	-
Corridor Area		0.40	Decorative/Display	0.25
Dining Area	Bar/Lounge and Fine Dining	0.45	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' General Lighting Ceiling Height > 10'	0.35 1.25 W/ft 1.5 W/ft 1.7 W/ft 0.45 0.52 0.60 0.25
	Cafeteria/Fast Food	0.45	Decorative/Display	0.25
	Family and Leisure	0.40	Decorative/Display	0.25
Electrical, Mechanical, Telephone Rooms		0.40	Detailed Task Work[7]	0.20
Exercise/Fitness Center and Gymnasium Area		0.50	-	-
Financial Transaction Area		0.70	Decorative/Display	0.25
Healthcare Facility and Hospitals	Exam/Treatment Room	1.15	-	-
	Imaging Room	0.60	Decorative/Display	0.20
			Tunable white or dim-to-warm[10]	0.10
	Medical Supply Room	0.55	-	-
	Nursery	0.80	Tunable white or dim-to-warm[10]	0.10
	Nurse's Station	0.85	Tunable white or dim-to-warm[10]	0.10
			Detailed Task Work[7]	0.20
	Operating Room	1.90	-	-
	Patient Room	0.70	Decorative/Display	0.15
			Tunable white or dim-to-warm[10]	0.10
	Physical Therapy Room	0.75	Tunable white or dim-to-warm[10]	0.10
	Recovery Room	0.90	Tunable white or dim-to-warm[10]	0.10
Hotel Function Area		0.85	Decorative/Display	0.25
Kitchen/Food Preparation Area		0.95	-	-
Laboratory, Scientific		0.90	Specialized Task Work[8]	0.35
Laundry Area		0.45	-	-
Library	Reading Area	0.80	Decorative/Display	0.25
	Stacks Area	1.00	-	-
Lobby~~, Main Entry~~		0.70	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14'	0.25 3 W/ft 3.5 W/ft 4 W/ft
Locker Room		0.45	-	-
Lounge, Breakroom, or Waiting Area		0.55	Decorative/Display	0.25
Manufacturing, Commercial & Industrial Work Area	Low Bay	0.60	Detailed Task Work[7]	0.20
	High Bay	0.65	Detailed Task Work[7]	0.20
	Precision	0.85	Precision Specialized Work[9]	0.70

Museum Area	Exhibition/Display	~~0.60~~ 0.40	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14'	0.45 11.2 W/ft 13.1 W/ft 14.9 W/ft 0.70 0.82 0.93
	Restoration Room	0.70	Detailed Task Work[7]	0.35
Office Area	> 250 square feet	0.60	Decorative/Display and Portable lighting for office areas[6]	0.20
	≤ 250 square feet	0.65		
Parking Garage Area	Parking Zone and Ramps	0.10	First ATM or Ticket Machine	100 W
			Additional ATM or Ticket Machine	50 W each
	Daylight Adaptation Zones[2]	1.00	-	-
Pharmacy Area		1.00	Specialized Task Work[8]	0.35
Retail Sales Area	Grocery Sales	1.00	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' General Lighting Ceiling Height > 10'	0.35 6.6 W/ft 7.76 W/ft 8.8 W/ft 0.60 0.70 0.80 0.10
	Retail Merchandise Sales	0.95	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' Valuable Display Case General Lighting Ceiling Height > 10'	0.35 9.5 W/ft 11.2 W/ft 12.7 W/ft 0.45 0.52 0.60 0.50 0.10
	Fitting Room	0.60	External Illuminated Mirror[5]	40 W/ea
			Internal Illuminated Mirror[5]	120 W/ea
Religious Worship Area		0.95	Decorative/Display	0.25
Restrooms		0.65	Decorative/Display	0.35
Stairwell		0.60	Decorative/Display	0.35
Storage, Commercial/Industrial	Warehouse	0.40	-	-
	Shipping & Handling	0.60	-	-
Sports Arena – Playing Area	Class I Facility[13]	2.25	-	-
Sports Arena – Playing Area	Class II Facility[13]	1.45	-	-
Sports Arena – Playing Area	Class III Facility[13]	1.10	-	-
Sports Arena – Playing Area	Class IV Facility[13]	0.75	-	-
Theater Area	Motion picture	0.50	Decorative/Display	0.25
Theater Area	Performance	0.80	Decorative/Display	0.25
Transportation Function	Baggage Area	0.40	-	-
	Ticketing Area	0.45	Decorative/Display	0.20
Videoconferencing Studio		0.90	Videoconferencing[14]	1.00
All other		0.40	-	-

Footnotes for this table are listed below.
1. White board or chalk board. – Directional lighting dedicated to a white board or chalk board.
2. Daylight Adaptation Zones shall be no longer than 66 feet from the entrance to the parking garage.
3. ~~Reserved~~ MH is the Mounting Height which is the height in feet above finished floor and bottom of the luminaire. If luminaires are mounted at more than one mounting height in the same space, the average mounting height shall be used to determine the additional allowance.
4. Reserved
5. Illuminated mirrors. Lighting shall be dedicated to the mirror.
6. Portable lighting in office areas includes under shelf or furniture-mounted supplemental task lighting qualifies when controlled by a time clock or an occupancy sensor.
7. Detailed task work – Lighting provides high level of visual acuity required for activities with close attention to small elements and/or extreme close-up work.
8. Specialized task work – Lighting provides for small-scale, cognitive or fast performance visual tasks; lighting required for operating specialized equipment associated with pharmaceutical/laboratorial activities.
9. Precision specialized work – Lighting for work performed within a commercial or industrial environment that entails working with low contrast, finely detailed, or fast-moving objects.
10. Tunable white luminaires capable of color change greater than or equal to 2000K CCT, or dim-to-warm luminaires capable of color change greater than or equal to 500K CCT, connected to controls that allows color changing of the luminaires.
11. Aging Eye/Low-vision areas can be documented as being designed to comply with the light levels in ANSI/IES RP-28 and are or will be licensed by local or state authorities for either senior long-term care, adult day care, senior support, and/or people with special visual needs.
12. Transition lighting OFF at night. Lighting power controlled by astronomical time clock or other control to shut off lighting at night. Additional LPD only applies to area within 30 feet of an exit. Not applicable to lighting in daylit zones.
13. Class I Facility is used for competition play for 5000 or more spectators. Class II Facility is used for competition play for up to 5000 spectators. Class III Facility is used for competition play for up to 2000 spectators. Class IV Facility is normally used for recreational play and there is limited or no provision for spectators.
14. The additional videoconferencing lighting power shall be allowed provided the videoconferencing studio meets all the requirements of Section 140.6(c)2Gvii.

~~*TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES*~~

~~1~~	~~2~~	~~3~~	~~4~~	~~5~~
~~Primary Function Area~~	~~General Illumination Level (Lux)~~	~~Wall Display Lighting Power Density (W/ft)~~	~~Allowed Combined Floor Display Power and Task Lighting Power Density (W/ft^2)~~	~~Allowed Decorative/ Special Effect Lighting Power Density (W/ft^2)~~
~~Auditorium Area~~	~~300~~	~~3.00~~	~~0.20~~	~~0.35~~
~~Convention, Conference, Multipurpose, and Meeting Center Areas~~	~~300~~	~~2.00~~	~~0.30~~	~~0.35~~
~~Dining Areas~~	~~200~~	~~1.25~~	~~0.45~~	~~0.35~~
~~Exhibit, Museum Areas~~	~~150~~	~~11.20~~	~~0.70~~	~~0.35~~
~~Hotel Area:~~	~~-~~	~~-~~	~~-~~	~~-~~
~~Ballroom/Events~~	~~400~~	~~1.80~~	~~0.12~~	~~0.35~~
~~Lobby~~	~~200~~	~~3.40~~	~~0.20~~	~~0.35~~

Lobby, Main entry	200	3.40	0.20	0.35
Religious Worship Area	300	1.30	0.40	0.35
Retail Sales	-	-	-	-
Grocery	600	6.60	0.60	0.35
Merchandise Sales, and Showroom Areas	500	11.50	0.70	0.35
Theater Area:	-	-	-	-
Motion picture	200	2.00	0.20	0.35
Performance Arts	200	7.30	0.20	0.35

TABLE 140.6-E TAILORED WALL AND FLOOR DISPLAY MOUNTING HEIGHT ADJUSTMENT FACTORS

Height in feet above finished floor and bottom of luminaire(s)	Floor Display or Wall Display Mounting Height Adjustment Factor
≤ 10′ 6″	1.00
> 10′-6″ to 14′-0″	0.85
>14′ 0″ to 18′ 0″	0.75
> 18′ 0″	0.70

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

$$RCR = \frac{5 * H * (L + W)}{L * W}$$

Room cavity ratio for irregular-shaped rooms

$$RCR = \frac{2.5 * H * P}{A}$$

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 TAILORED METHOD GENERAL LIGHTING POWER ALLOWED – BY ILLUMINANCE AND ROOM CAVITY RATIO

General Lighting Power Density (W/ft²) for the following RCR values[b]

General Illuminance Level (lux)[a]	RCR ≤ 2.0	RCR > 2.0 and ≤ 3.5	RCR > 3.5 and ≤ 7.0	RCR > 7.0

150	0.35	0.40	0.50	0.65
200	0.40	0.50	0.65	0.85
300	0.55	0.70	0.85	1.20
400	0.65	0.80	1.05	1.25
500	0.80	0.90	1.25	1.55
600	0.90	1.05	1.40	2.00

[a] Illuminance values from Column 2 of TABLE 140.6-D.
[b] RCR values are calculated using applicable equations in TABLE 140.6-F.

Option 2: Remove Tailored and Add IECC Allowances to Area Category Method

140.6(a)4. Luminaire Classification and Power Adjustment.

C. Tailored Method Display Lighting Mounting Height Lighting Power Adjustment. For wall-display luminaires or floor-display luminaires meeting Tailored Method Section 140.6(c)3G and H and where the bottom of luminaires are 10 feet 7 inches and greater above the finished floor, the adjusted indoor lighting power of these luminaires shall be calculated by multiplying their maximum rated wattage and the appropriated mounting height adjustment factor from Table 140.6-E. Luminaire mounting height is the distance from the finished floor to the bottom of the luminaire. General lighting shall not qualify for a mounting height multiplier.

140.6(b) Calculation of Allowed Indoor Lighting Power: General Rules.

3. The allowed indoor lighting power density allotment for general lighting shall be calculated as follows:

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 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-D (or TABLE 140.6-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 TABLE 140.6-D (or TABLE 140.6-C if the Area Category Method is used for that area);

The allowed indoor lighting power 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 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 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; 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; decorative/special effect; or very valuable display case; may not be increased, or otherwise traded between any of the separate allotments.~~

140.6(c). Calculation of Allowed Indoor Lighting Power: Specific Methodologies.

The allowed indoor lighting power for each building type, or each primary function area shall be calculated using only one of the methods in Subsection 1~~, 2~~ or ~~3~~2 below as applicable.

2. Area Category Method.

G. In addition to the allowed indoor lighting power calculated according to Sections 140.6(c)2A through F, the building may add additional lighting power allowances for qualifying lighting systems as specified in the Qualifying Lighting Systems column in TABLE 140.6-C under the following conditions:

i. Only primary function areas having a lighting system as specified in the Qualifying Lighting Systems column in TABLE 140.6-C and in accordance with the corresponding footnote of the TABLE shall qualify for the additional lighting power allowances; 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

~~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.~~

~~B. Allowed Indoor Lighting Power allotments for general lighting shall be determined according to Section 140.6(c)3F, as applicable.~~

~~C. For compliance with Section 140.6(c)3, an "area" shall be defined as all contiguous areas that 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 allotments for general lighting calculated according to Sections 140.6(c)3F, as applicable, the building may add additional lighting power allowances for wall display lighting, floor display lighting and task lighting, decorative/special effects lighting, and very valuable display cases lighting according to Sections 140.6(c)3G through J.~~

~~F. Determine allowed indoor lighting power allotments for general lighting for primary function areas listed in TABLE 140.6-D as follows:~~

~~i. Use the General Illumination Level (Lux) listed in Column 2 of TABLE 140.6-D 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.~~

~~iii. Find the allowed General Lighting Power Density allotments in TABLE 140.6-G that is applicable to the General Illuminance Level (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.~~

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 allotment for general lighting for the area.

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

ii. 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 luminaires providing directional display light.)

iii. 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 within two feet of the ceiling or are taller than ten feet and (II) are permanently anchored to the floor.

iv. For wall display lighting where the bottom of the luminaire is greater than 10 feet 6 inches above the finished floor, the mounting height adjustment factor from Table 140.6-E can be used to adjust the installed luminaire wattage as specified in Section 140.6(a)4C.

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

a. the "wall display lighting power density" determined in accordance with TABLE 140.6-D, multiplied by the wall display lengths determined in accordance with Item iii; and

b. The Adjusted Indoor Lighting Power used for the wall display lighting systems.

vi. Lighting internal to display cases that are attached to a wall or directly adjacent to a wall are counted as wall display lighting as specified in Section 140.6(c)3G. All other lighting internal to display cases are counted as floor

~~display lighting as specified in Section 140.6(c)3H, or as very valuable display case lighting as specified in Section 140.6(c)3J.~~

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

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

~~ii. Lighting internal to display cases that are not attached to a wall and not directly adjacent to a wall shall be counted as floor display lighting in accordance with Section 140.6(c)3H; or very valuable display case lighting in accordance with Section 140.6(c)3J.~~

~~iii. 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.~~

~~iv. Qualifying floor display lighting shall:~~

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

~~b. Consist of only (I) directional lamp types, such as PAR, R, MR, AR; or (II) luminaires providing directional display light.~~

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

~~v. 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.~~

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

~~vii. The square footage of floor displays 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.~~

~~viii. For floor display lighting where the bottom of the luminaire is greater than 10.6 feet above the finished floor, multiply the floor display installed watts by the~~

appropriate mounting height adjustment factor from Table 140.6-E to calculate the Adjusted Indoor Lighting Power as specified in Section 140.6(a)4C.

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

a. The allowed floor display and task lighting power determined in accordance with Section 140.6(c)3Hvi multiplied by the floor square footage determined in accordance with Section 140.6(c)3Hvii; and

b. The Adjusted Indoor Lighting Power used for the floor display lighting systems.

I. Determine additional allowed power for decorative/special effects lighting as follows:

i. Qualifying decorative 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.

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

iii. Additional lighting power for decorative/special effects lighting shall be used only in areas having decorative/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 decorative/special effects lighting.

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

a. The product of the "allowed decorative/special effects lighting power" determined in accordance with Section 140.6(c)3Iii, multiplied by the floor square footage determined in accordance with Section 140.6(c)3Iiii; and

b. The Adjusted Indoor Lighting Power of allowed decorative/special effects lighting.

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

i. 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.

ii. 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.

~~iii. 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.~~

~~iv. If there is qualifying very valuable display case lighting, in accordance with Section 140.6(c)3Jii, 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 0.50 watt per square foot; or~~

~~b. The product of the area of the display case and 7 watts per square foot; or~~

~~c. The Adjusted Indoor Lighting Power of lighting for very valuable displays.~~

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

Primary Function Area		Allowed Lighting Power Density for General Lighting (W/ft²)	Additional Lighting Power	
			Qualified Lighting Systems	Additional Allowance (W/ft², unless noted otherwise)
Aging Eye/Low-vision[11]	Corridor Area	0.70	Decorative/Display	0.30
	Dining	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Lobby, Main Entry	0.85	Decorative/Display	0.30
			Transition Lighting OFF at night[12]	0.95
			Tunable white or dim-to-warm[10]	0.10
	Lounge/Waiting Area	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Multipurpose Room	0.85	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Religious Worship Area	1.00	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Restroom	1.00	Decorative/Display	0.20
	Stairwell	0.80	Decorative/Display	0.30
Audience Seating Area		0.50	Decorative/Display	0.25
Auditorium Area		~~0.70~~ 0.57	Decorative/Display	~~0.45~~ 0.55
Auto Repair / Maintenance Area		0.55	Detailed Task Work[7]	0.20
Barber, Beauty Salon, Spa Area		0.70	Detailed Task Work[7]	0.30
			Decorative/Display	0.25
Civic Meeting Place Area		0.90	Decorative/Display	0.25
Classroom, Lecture, Training, Vocational Area		0.60	White or Chalk Board[1]	7 W/ft
Concourse and Atria Area		0.60	Decorative/Display	0.25
Convention, Conference, Multipurpose and Meeting Area		~~0.75~~ 0.88	Decorative/Display	~~0.25~~ 0.55
Copy Room		0.50	-	-
Corridor Area		0.40	Decorative/Display	0.25
Dining Area	Bar/Lounge and Fine Dining	~~0.45~~ 0.76	Decorative/Display	~~0.35~~ 0.55
	Cafeteria/Fast Food	0.45	Decorative/Display	0.25
	Family and Leisure	0.40	Decorative/Display	0.25

Electrical, Mechanical, Telephone Rooms		0.40	Detailed Task Work[7]	0.20
Exercise/Fitness Center and Gymnasium Area		0.50	-	-
Financial Transaction Area		0.70	Decorative/Display	0.25
Healthcare Facility and Hospitals	Exam/Treatment Room	1.15	-	-
	Imaging Room	0.60	Decorative/Display	0.20
			Tunable white or dim-to-warm[10]	0.10
	Medical Supply Room	0.55	-	-
	Nursery	0.80	Tunable white or dim-to-warm[10]	0.10
	Nurse's Station	0.85	Tunable white or dim-to-warm[10]	0.10
			Detailed Task Work[7]	0.20
	Operating Room	1.90	-	-
	Patient Room	0.70	Decorative/Display	0.15
			Tunable white or dim-to-warm[10]	0.10
	Physical Therapy Room	0.75	Tunable white or dim-to-warm[10]	0.10
	Recovery Room	0.90	Tunable white or dim-to-warm[10]	0.10
Hotel Function Area		~~0.85~~ 0.88	Decorative/Display	~~0.25~~ ~~0.55~~
Kitchen/Food Preparation Area		0.95	-	-
Laboratory, Scientific		0.90	Specialized Task Work[8]	0.35
Laundry Area		0.45	-	-
Library	Reading Area	0.80	Decorative/Display	0.25
	Stacks Area	1.00	-	-
Lobby, Main Entry		~~0.70~~ 0.80	Decorative/Display	~~0.25~~ 0.66
Locker Room		0.45	-	-
Lounge, Breakroom, or Waiting Area		0.55	Decorative/Display	0.25
Manufacturing, Commercial & Industrial Work Area	Low Bay	0.60	Detailed Task Work[7]	0.20
	High Bay	0.65	Detailed Task Work[7]	0.20
	Precision	0.85	Precision Specialized Work[9]	0.70
Museum Area	Exhibition/Display	~~0.60~~ 0.55	Decorative/Display	~~0.45~~ 0.70
	Restoration Room	0.70	Detailed Task Work[7]	0.35
Office Area	> 250 square feet	0.60	Decorative/Display and Portable lighting for office areas[6]	0.20
	≤ 250 square feet	0.65		
Parking Garage Area	Parking Zone and Ramps	0.10	First ATM or Ticket Machine	100 W
			Additional ATM or Ticket Machine	50 W each
	Daylight Adaptation Zones[2]	1.00	-	-
Pharmacy Area		1.00	Specialized Task Work[8]	0.35
Retail Sales Area	~~Grocery Sales~~	~~1.00~~	~~Decorative/Display~~	~~0.35~~
	Retail Merchandise Sales and Grocery	~~0.95~~ 0.85	Decorative~~/Display~~ Initial Watts per Building Sales Display Retail 1 Sales Display Retail 2 Sales Display Retail 3 Sales Display Retail 4	~~0.35~~ 0.55 750 W 0.40 0.40 0.70 1.00
	Fitting Room	0.60	External Illuminated Mirror[5]	40 W/ea
			Internal Illuminated Mirror[5]	120 W/ea
Religious Worship Area		~~0.95~~ 0.75	Decorative/Display	~~0.25~~ 0.55

Restrooms		0.65	Decorative/Display	0.35
Stairwell		0.60	Decorative/Display	0.35
Storage, Commercial/Industrial	Warehouse	0.40	-	-
	Shipping & Handling	0.60	-	-
Sports Arena – Playing Area	Class I Facility[13]	2.25	-	-
Sports Arena – Playing Area	Class II Facility[13]	1.45	-	-
Sports Arena – Playing Area	Class III Facility[13]	1.10	-	-
Sports Arena – Playing Area	Class IV Facility[13]	0.75	-	-
Theater Area	Motion picture	~~0.50~~ 0.27	Decorative/Display	~~0.25~~ 0.55
Theater Area	Performance	~~0.80~~ 1.09	Decorative/Display	~~0.25~~ 0.55
Transportation Function	Baggage Area	0.40	-	-
	Ticketing Area	0.45	Decorative/Display	0.20
Videoconferencing Studio		0.90	Videoconferencing[14]	1.00
All other		0.40	-	-

Footnotes for this table are listed below.

1. White board or chalk board. – Directional lighting dedicated to a white board or chalk board.
2. Daylight Adaptation Zones shall be no longer than 66 feet from the entrance to the parking garage.
3. ~~Reserved~~
   Sales Display Retail 1: Sales area for all products not listed in Area 2, 3, or 4
   Sales Display Retail 2: Sales area for vehicles, sporting goods and small electronics
   Sales Display Retail 3: Sales area for furniture, clothing, cosmetics and artwork
   Sales Display Retail 4: Sales area for jewelry, crystal and china
4. Reserved
5. Illuminated mirrors. Lighting shall be dedicated to the mirror.
6. Portable lighting in office areas includes under shelf or furniture-mounted supplemental task lighting qualifies when controlled by a time clock or an occupancy sensor.
7. Detailed task work – Lighting provides high level of visual acuity required for activities with close attention to small elements and/or extreme close-up work.
8. Specialized task work – Lighting provides for small-scale, cognitive or fast performance visual tasks; lighting required for operating specialized equipment associated with pharmaceutical/laboratorial activities.
9. Precision specialized work – Lighting for work performed within a commercial or industrial environment that entails working with low contrast, finely detailed, or fast-moving objects.
10. Tunable white luminaires capable of color change greater than or equal to 2000K CCT, or dim-to-warm luminaires capable of color change greater than or equal to 500K CCT, connected to controls that allows color changing of the luminaires.
11. Aging Eye/Low-vision areas can be documented as being designed to comply with the light levels in ANSI/IES RP-28 and are or will be licensed by local or state authorities for either senior long-term care, adult day care, senior support, and/or people with special visual needs.
12. Transition lighting OFF at night. Lighting power controlled by astronomical time clock or other control to shut off lighting at night. Additional LPD only applies to area within 30 feet of an exit. Not applicable to lighting in daylit zones.
13. Class I Facility is used for competition play for 5000 or more spectators. Class II Facility is used for competition play for up to 5000 spectators. Class III Facility is used for competition play for up to 2000 spectators. Class IV Facility is normally used for recreational play and there is limited or no provision for spectators.
14. The additional videoconferencing lighting power shall be allowed provided the videoconferencing studio meets all the requirements of Section 140.6(c)2Gvii.

~~*TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES*~~

~~1~~	~~2~~	~~3~~	~~4~~	~~5~~
~~Primary Function Area~~	~~General Illumination Level (Lux)~~	~~Wall Display Lighting Power Density (W/ft)~~	~~Allowed Combined Floor Display Power and Task Lighting Power~~	~~Allowed Decorative/ Special Effect Lighting Power~~

			Density (W/ft²)	Density (W/ft²)
Auditorium Area	300	3.00	0.20	0.35
Convention, Conference, Multipurpose, and Meeting Center Areas	300	2.00	0.30	0.35
Dining Areas	200	1.25	0.45	0.35
Exhibit, Museum Areas	150	11.20	0.70	0.35
Hotel Area:	-	-	-	-
Ballroom/Events	400	1.80	0.12	0.35
Lobby	200	3.40	0.20	0.35
Lobby, Main entry	200	3.40	0.20	0.35
Religious Worship Area	300	1.30	0.40	0.35
Retail Sales	-	-	-	-
Grocery	600	6.60	0.60	0.35
Merchandise Sales, and Showroom Areas	500	11.50	0.70	0.35
Theater Area:	-	-	-	-
Motion picture	200	2.00	0.20	0.35
Performance Arts	200	7.30	0.20	0.35

TABLE 140.6-E TAILORED WALL AND FLOOR DISPLAY MOUNTING HEIGHT ADJUSTMENT FACTORS

Height in feet above finished floor and bottom of luminaire(s)	Floor Display or Wall Display Mounting Height Adjustment Factor
≤ 10’ 6”	1.00
> 10’ 6” to 14’ 0”	0.85
>14’ 0” to 18’ 0”	0.75
> 18’ 0”	0.70

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

$$RCR = \frac{5 * H * (L + W)}{L * W}$$

Room cavity ratio for irregular-shaped rooms

$$RCR = \frac{2.5 * H * P}{A}$$

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 TAILORED METHOD GENERAL LIGHTING POWER ALLOWED – BY ILLUMINANCE AND ROOM CAVITY RATIO

General Lighting Power Density (W/ft^2) for the following RCR values[b]

General Illuminance Level (lux)[a]	RCR ≤ 2.0	RCR > 2.0 and ≤ 3.5	RCR > 3.5 and ≤ 7.0	RCR > 7.0
150	0.35	0.40	0.50	0.65
200	0.40	0.50	0.65	0.85
300	0.55	0.70	0.85	1.20
400	0.65	0.80	1.05	1.25
500	0.80	0.90	1.25	1.55
600	0.90	1.05	1.40	2.00

[a] Illuminance values from Column 2 of TABLE 140.6-D.
[b] RCR values are calculated using applicable equations in TABLE 140.6-F.

Option 3: Simplify Tailored Method Tables and S140.6 Language

140.6(a)4. Luminaire Classification and Power Adjustment.

~~i.~~ C. Tailored Method Display Lighting Mounting Height Lighting Power Adjustment. For wall display luminaires or floor display luminaires meeting Tailored Method Section 140.6(c)3G and H and where the bottom of luminaires are 10 feet 7 inches and greater above the finished floor, the adjusted indoor lighting power of these luminaires shall be calculated by multiplying their maximum rated wattage and the appropriated mounting height adjustment factor as follows: ~~from Table 140.6-E~~. ~~Luminaire mounting height is the distance from the finished floor to the bottom of the luminaire. General lighting shall not qualify for a mounting height multiplier.~~

~~ii.~~i. The adjustment factor is 0.85 for the luminaire mounting height greater than 10 feet 6 inches and less than 14 feet;

~~iii.~~ii. the adjustment factor is 0.75 for the mounting height greater than 14 feet and less than 18 feet; and

~~iv.~~iii. the adjustment factor is 0.7 for the mounting height greater than 18 feet.

Luminaire mounting height is the distance from the finished floor to the bottom of the luminaire. General lighting shall not qualify for a mounting height multiplier.

140.6(c)3. Calculation of allowed indoor lighting power: specific methodologies.

F. Determine allowed indoor lighting power allotments for general lighting for primary function areas listed in TABLE 140.6-D as follows:

i. ~~Use the General Illumination Level (Lux) listed in Column 2 of TABLE 140.6-D 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.~~ as follows:

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

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

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

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

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

ii. 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 luminaires providing directional display light.)

iii. 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 within two feet of the ceiling or are taller than ten feet and (II) are permanently anchored to the floor.

iv. For wall display lighting where the bottom of the luminaire is greater than 10 feet 6 inches above the finished floor, the mounting height adjustment factor ~~from Table 140.6-E~~ can be used to adjust the installed luminaire wattage as specified in Section 140.6(a)4C.

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

a. the "wall display lighting power density" determined in accordance with TABLE 140.6-D, multiplied by the wall display lengths determined in accordance with Item iii; and

b. The Adjusted Indoor Lighting Power used for the wall display lighting systems.

vi. Lighting internal to display cases that are attached to a wall or directly adjacent to a wall are counted as wall display lighting as specified in Section 140.6(c)3G. All other lighting internal to display cases are counted as floor display lighting as specified in Section 140.6(c)3H, or as very valuable display case lighting as specified in Section 140.6(c)3J.

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

viii. For floor display lighting where the bottom of the luminaire is greater than 10.6 feet above the finished floor, multiply the floor display installed watts by the appropriate mounting height adjustment factor ~~from Table 140.6-E~~ to calculate the Adjusted Indoor Lighting Power as specified in Section 140.6(a)4C.

TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES

Primary Function Area (specified RCR*)	~~General Illumination Level (Lux)~~ Allowed LPD for General Lighting (W/ft^2)	Additional Lighting Power	
		Qualified Lighting Systems	Additional Allowance
~~Auditorium~~	~~300~~		
~~Convention, Conference, Multipurpose, and Meeting Center Areas~~	~~300~~		
Bar/ Lounge and Fine Dining Areas	~~200~~	Wall display lighting (W/ft)	1.25
RCR < 2.0	0.4	Floor Display & Task (W/ft^2)	0.45
2.0 < RCR <=3.5	0.5		
3.5 < RCR <=7.0	0.65		
7.0 < RCR	0.85	Decorative (W/ft^2)	0.35
~~Hotel Ballroom/Events~~	~~400~~		
~~Hotel Lobby~~	~~200~~		
Main Entry Lobby	~~200~~	Wall Display lighting (W/ft)	3.40
RCR < 2.0	0.4	Floor Display & Task (W/ft^2)	0.20
2.0 < RCR <=3.5	0.5		
3.5 < RCR <=7.0	0.65		
7.0 < RCR	0.85	Decorative (W/ft^2)	0.35
Museum Exhibit/ Display	~~150~~	Wall display lighting (W/ft)	11.20
RCR < 2.0	0.35	Floor Display & Task (W/ft^2)	0.70
2.0 < RCR <=3.5	0.40		
3.5 < RCR <=7.0	0.50	Decorative (W/ft^2)	0.35
7.0 < RCR	0.65	Valuable Display Case (W/sf-floor)	0.50
Religious Worship Area	~~300~~	Wall display lighting (W/ft)	1.3
RCR < 2.0	0.55	Floor Display & Task (W/ft^2)	0.40
2.0 < RCR <=3.5	0.70		
3.5 < RCR <=7.0	0.85		
7.0 < RCR	1.2	Decorative (W/ft^2)	0.35

		Valuable Display Case (W/sf-floor)	0.50
~~Retail Grocery Sales~~	~~600~~		
Retail Merchandise Sales	~~500~~	Wall Display Lighting (W/ft)	11.5
RCR < 2.0	0.80	Floor Display & Task (W/ft^2)	0.70
2.0 < RCR <=3.5	0.90		
3.5 < RCR <=7.0	1.25	Decorative (W/ft^2)	0.35
7.0 < RCR	1.55	Valuable Display Case (W/sf-floor)	0.50
~~Theatre, Motion Picture~~	~~200~~		
~~Theatre, Performance Arts~~	~~200~~		

*RCR is the room cavity ratio of the enclosed space containing the primary function area and is calculated according to Section 140.6(c)3.F.i.

~~*TABLE 140.6-E TAILORED WALL AND FLOOR DISPLAY MOUNTING HEIGHT ADJUSTMENT FACTORS*~~

~~Height in feet above finished floor and bottom of luminaire(s)~~	~~Floor Display or Wall Display Mounting Height Adjustment Factor~~
~~≤ 10' 6"~~	~~1.00~~
~~> 10'-6" to 14'-0"~~	~~0.85~~
~~>14' 0" to 18' 0"~~	~~0.75~~
~~> 18' 0"~~	~~0.70~~

~~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~~

$$RCR = \frac{5 * H * (L + W)}{L * W}$$

~~Room cavity ratio for irregular-shaped rooms~~

$$RCR = \frac{2.5 * H * P}{A}$$

~~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 TAILORED METHOD GENERAL LIGHTING POWER ALLOWED – BY ILLUMINANCE AND ROOM CAVITY RATIO*~~

~~*General Lighting Power Density (W/ft^2) for the following RCR values[b]*~~

~~General Illuminance Level (lux)[a]~~	~~RCR ≤ 2.0~~	~~RCR > 2.0 and ≤ 3.5~~	~~RCR > 3.5 and ≤ 7.0~~	~~RCR > 7.0~~
~~150~~	~~0.35~~	~~0.40~~	~~0.50~~	~~0.65~~
~~200~~	~~0.40~~	~~0.50~~	~~0.65~~	~~0.85~~

300	0.55	0.70	0.85	1.20
400	0.65	0.80	1.05	1.25
500	0.80	0.90	1.25	1.55
600	0.90	1.05	1.40	2.00

[a] Illuminance values from Column 2 of TABLE 140.6-D.
[b] RCR values are calculated using applicable equations in TABLE 140.6-F.

Power Adjustment Factors

140.6(a)2. Reduction of wattage through controls.

In calculating Adjusted Indoor Lighting Power, 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.

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, 0.2 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 installed watts as allowed by Section 140.6(a)2 for calculating the Adjusted Indoor Lighting Power. If only a portion of the wattage in a luminaire is controlled in accordance with Section 140.6(a)2, then only that portion of controlled wattage may be reduced in calculating Adjusted Indoor Lighting Power.

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. PAFs shall not be available for lighting controls required by Part 6.-A

H. To qualify for the PAF for daylight continuous dimming plus OFF control, the daylight control and controlled luminaires shall comply with Section 130.1(d), 130.4(a)3 and 130.4(a)7, and the daylight control shall be continuous dimming and shall additionally turn lights completely OFF when the daylight available in the daylit zone is greater than 150 percent of the illuminance received from the general lighting system at full power. The PAF shall apply to the luminaires in the primary sidelit daylit zone, secondary sidelit daylit zone and the skylit daylit zone.

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

i. The 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, ~~o~~fr 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 an Institutional Tuning in TABLE 140.6-A, the tuned lighting system shall comply with all of the following requirements:

i. The lighting controls shall limit the maximum output or maximum power draw of the controlled lighting to 85 percent or less of full light output or full power draw; and

ii. The means of setting the limit is accessible only to authorized personnel; and

iii. The setting of the limit is verified by the acceptance test required by Section 130.4(a)7; and

iv. The construction documents specify which lighting systems shall have their maximum light output or maximum power draw set to no greater than 85% of full light output or full power draw.

K. To qualify for the PAF for a Demand Responsive Control in TABLE 140.6-A, the general lighting wattage receiving the PAF shall not be within the scope of Section 110.12(c) and a Demand Responsive Control shall meet all of the following requirements:

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

ii. General lighting shall be reduced in a manner consistent with uniform level of illumination requirements in TABLE 130.1-A.

L. To qualify for the PAFs for clerestory fenestration, horizontal slats, or light shelves in TABLE 140.6-A, the daylighting design shall meet the requirements in Section 140.3(d). The PAFs shall only apply to lighting in a primary or secondary sidelit daylit zone where continuous dimming daylighting controls meeting the requirements of Section 130.1(d) are installed.

TABLE 140.6-A LIGHTING POWER 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. Daylight Continuous Dimming plus OFF Control	Luminaires in skylit daylit zone or primary sidelit daylit zone or secondary sidelit daylit zone		0.10
2. Occupant Sensing Controls in Offices Larger than 250 square feet	One sensor controlling an area that is:	No larger than 125 square feet	0.30
		From 126 to 250 square feet	0.20
3.Institutional Tuning	Luminaires in non-daylit areas. Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.		0.10
	Luminaires in daylit areas. Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.		0.05
4. Demand Responsive Control	General lighting luminaires not in the scope of Section 110.12(c). If DR controls are required, then this PAF is not available for any lighting in the project. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF		0.05
5. Clerestory Fenestration	Luminaires in daylit areas adjacent to the clerestory. Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF.		0.05
6. Horizontal Slats	Luminaires in daylit areas adjacent to vertical fenestration with interior or exterior horizontal slats. Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF.		0.05
7.Light Shelves	Luminaires in daylit areas adjacent to clerestory fenestration with interior or exterior light shelves. This PAF may be combined with the PAF for clerestory fenestration. Luminaires that qualify for daylight ~~dimming plus~~dimming plus OFF control may also qualify for this		0.10

	PAF	

Acceptance Testing Requirements

Appendix NA7 – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes

7.1 Purpose and Scope

This appendix defines acceptance procedures that must be completed on certain controls and equipment before the installation is deemed to be in compliance with the Standards. These requirements apply to all newly installed equipment for which there are acceptance requirements in new and existing buildings. The procedures apply to nonresidential, high-rise residential, hotel/motel buildings and covered processes as defined by the California Energy Commission's Energy Efficiency Standards for Nonresidential Buildings (Standards). The purpose of the acceptance tests is to assure:

(a) The presence of equipment or building components according to the specifications in the compliance documents.

(b) Installation quality and proper functioning of the controls and equipment to meet the intent of the design and the Standards.

Modifications and additions to these acceptance requirements needed to improve clarity or to better ensure proper installation and functionality may be approved by the Energy Commission.

7.2 Introduction

Acceptance requirements are defined as implementation of targeted inspection checks and functional and performance testing to determine whether specific building components, equipment, systems, and interfaces between systems conform to the criteria set forth in the Standards ~~and to related construction documents (plans or specifications)~~. Acceptance requirements improve code compliance effectiveness and help meet the expected level of performance.

Acceptance testing is not intended to take the place of commissioning or test and balance procedures that a building owner might incorporate into a building project. It is an adjunct process focusing only on demonstrating compliance with the Standards.

Third-party review of the information provided on Certificate of Acceptance documentation is not required, with one exception: duct leakage diagnostic test results for some constant volume space conditioning systems serving less than 5,000 square feet of conditioned floor area are required to be verified by a certified HERS Rater as specified in Standards Section 120.4(g).

7.3 Roles and Responsibilities

Individuals who perform the field testing and verification work, and provide the information required for completion of the Certificate of Acceptance documentation are not required to be licensed professionals. The person who signs the Certificate of Acceptance document to certify compliance with the acceptance requirements shall be licensed as specified in Standards Section 10-103(a)4.

It is the responsibility of the designer to specify products that meet these requirements. It is the responsibility of the installer to comply with all the mandatory requirements, even if the plans mistakenly do not. Code enforcement officials, in turn, must check that the mandatory features and specified devices are installed.

Residential

(k) Residential Lighting.

1. Light Source ~~Luminaire~~ Requirements

A. ~~**Luminaire Efficacy.**~~ All installed luminaires and lamps shall meet the requirements in Joint Appendix JA8~~TABLE 150.0-A~~.

EXCEPTION 1 to Section 150.0(k)1A: Integrated device lighting. Lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, ceiling fan kits that are subject to federal appliance regulations, and garage door openers.

EXCEPTION 2 to Section 150.0(k)1A: Navigation lighting such as night lights, step lights, and path lights less than 5 watts.

EXCEPTION 3 to Section 150.0(k)1A: Cabinet Lighting. Lighting internal to drawers, cabinetry, and linen closets with an efficacy of 45 lumens per watt or greater.

EXCEPTION 4 to Section 150.0(k)1A: The following luminaires:

1. LED light sources installed outdoors.

2. Inseparable Solid State Lighting (SSL) luminaires containing colored light sources that are installed to provide decorative lighting.

3. Pin-based linear fluorescent or compact fluorescent light sources using electronic ballasts.

4. High intensity discharge (HID) light sources including pulse start metal halide and high pressure sodium light sources.

5. Luminaires with hardwired high frequency generator and induction lamp.

~~B. **Screw Based Luminaires.** Screw based luminaires shall contain lamps that comply with Reference Joint Appendix JA8~~

C. **Recessed Downlight Luminaires in Ceilings.** Luminaires recessed into ceilings shall meet all ~~of~~ the following requirements:

i. Shall not contain screw base lamp sockets; and

ii. Have a label that certifies the luminaire is airtight rated with air leakage less than 2.0 cfm at 75 Pascals when tested in accordance with ASTM E283. An exhaust fan housing with integral light shall not be required to be certified airtight; and

iii. Be sealed with a gasket or caulk between the luminaire housing and ceiling, and have all air leak paths between conditioned and unconditioned spaces sealed with a gasket or caulk, or be installed per manufacturer's instructions to maintain airtightness between the luminaire housing and ceiling; and

iv. Meet the clearance and installation requirements of California Electrical Code Section 410.116 Installation in Fire-Resistant Construction for recessed luminaires.

EXCEPTION to Section 150.0(k)1Cii and iii: Recessed luminaires marked for use in fire-rated installations and recessed luminaires installed in non-insulated ceilings.

D. **Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources in enclosed or recessed luminaires shall be ~~that are not~~ compliant with the JA8 elevated temperature requirements, including marking requirements~~, shall not be installed in enclosed or recessed luminaires~~.

E. **Blank Electrical Boxes**. The number of electrical boxes that are more than 5 feet above the finished floor and do not contain a luminaire or other device shall be no greater than the number of bedrooms. These electrical boxes must be served by a dimmer, vacancy sensor control, low voltage wiring or fan speed control.

2. **Indoor Lighting Controls.**

A. Lighting shall have readily accessible wall-mounted controls that allow the lighting to be manually turned ON and OFF.

EXCEPTION to Section 150.0(k)2A: Ceiling fans may provide control of integrated lighting via a remote control.

~~B. No controls shall bypass a dimmer, occupant sensor or vacancy sensor function where that dimmer or sensor has been installed to comply with Section 150.0(k).~~

C. Lighting controls shall comply with the applicable requirements of Section 110.9 "Mandatory Requirements for Lighting Controls".

D. An Energy Management Control System (EMCS), ~~or a~~ multiscene programmable control, or any other control device may be used to comply with dimming, occupancy, and lighting control requirements in Section 150.0(k)2 if it provides the functionality of the specified controls in accordance with Section 110.9 "Mandatory Requirements for Lighting Controls", and the physical controls specified in 150.0(k)2A.

E. **Automatic Off Controls.**

i. In bathrooms, garages, laundry rooms, utility rooms, and walk-in closets, at least one installed luminaire shall be controlled by an occupancy or vacancy sensor providing automatic-off functionality.

ii. For lighting internal to drawers and cabinetry with opaque fronts or doors, controls that turn light off when the drawer or door is closed shall be provided.

F. **Dimming Controls**.

i. Lighting in habitable spaces~~, including but not limited to living rooms, dining rooms, kitchens, and bedrooms,~~ shall have readily accessible wall-mounted dimming controls that allow the lighting to be manually adjusted up and down.

ii. Forward phase cut dimmers controlling LED light sources in these spaces shall comply with National Electrical Manufacturers Association Phase Cut Dimming for Solid State Lighting: Basic Compatibility (NEMA SSL 7A).

EXCEPTION 1 to Section 150.0(k)2F: Ceiling fans may provide control of integrated lighting via a remote control.

EXCEPTION 2 to Section 150.0(k)2F: Luminaires connected to a circuit with controlled lighting power less than 20 watts or controlled by an occupancy or vacancy sensor providing automatic-off functionality.

EXCEPTION 3 to Section 150.0(k)2F: Navigation lighting such as night lights, step lights, and path lights less than 5 watts, and lighting internal to drawers and cabinetry with opaque fronts or doors or with automatic off controls.

G. **Independent controls.** Lighting integrated into ~~Integrated lighting of~~ exhaust fans shall be controlled independently from the fans. The following shall be controlled separately from ceiling-installed lighting such that one can be turned on without turning on the other:

i. Undercabinet lighting

ii. Undershelf lighting

iii. Interior lighting of display cabinets

iv. Switched outlets

3. **Residential Outdoor Lighting.** In addition to meeting the requirements of Section 150.0(k)1A, luminaires providing residential outdoor lighting shall meet the following requirements, as applicable:

A. For single-family residential buildings, outdoor lighting permanently mounted to a residential building or to other buildings on the same lot shall meet the following requirements: ~~in item i and the requirements in either item ii or item iii:~~

i. Controlled by a manual ON and OFF control switch that permits the automatic actions of items ii ~~or iii below~~; and

ii. Controlled by one of the following controls:

A~~ii~~. P~~Controlled by a p~~hotocell and ~~either~~ a motion sensor ~~or an automatic time switch control~~; OR~~or~~.

B. Photocell and an automatic time switch control; OR

C~~iii~~. A~~Controlled by an a~~stronomical time clock control.

B. Controls that override to ON shall not be allowed unless the override automatically returns the automatic control to its normal operation within 6 hours.

C. An energy management control system that provides the specified lighting control functionality and complies with all requirements applicable to the specified controls may be used to meet these requirements.

4. **Internally illuminated address signs.** Internally illuminated address signs shall either:

   A. Comply with Section 140.8 "Prescriptive Requirements for Signs"; or

   B. Consume no more than 5 watts of power.

5. **Residential Garages for Eight or More Vehicles.** Lighting for residential parking garages for eight or more vehicles shall comply with the applicable requirements for nonresidential garages in ~~Sections~~ Sections 110.9 "Mandatory Requirements for Lighting Controls", 130.0 "Lighting Systems and Equipment, and Electrical Power Distribution Systems—General", 130.1 "Mandatory Indoor Lighting Controls", 130.4 "Lighting Control Acceptance and Installation Certificate Requirements", 140.6 "Prescriptive Requirements for Indoor Lighting", and 141.0 "Additions, Alterations, and Repairs to Existing Nonresidential, and Hotel/Motel Buildings, To Existing Outdoor Lighting, and To Internally and Externally Illuminated Signs~~110.9, 130.0, 130.1, 130.4, 140.6, and 141.0~~.

~~*TABLE 150.0-A CLASSIFICATION OF HIGH LUMINOUS EFFICACY LIGHT SOURCES*~~

~~**Light sources in this column other than those installed in ceiling recessed downlight luminaires are classified as high luminous efficacy and are not required to comply with Reference Joint Appendix JA8.**~~	~~**Light sources in this column are required to comply with Reference Joint Appendix JA8 and shall be certified and marked as required by JA8.**~~
~~1. LED light sources installed outdoors.~~ ~~2. Inseparable Solid State Lighting (SSL) luminaires containing colored light sources that are installed to provide decorative lighting.~~ ~~3. Pin-based linear fluorescent or compact fluorescent light sources using electronic ballasts.~~ ~~4. High intensity discharge (HID) light sources including pulse start metal halide and high pressure sodium light sources.~~ ~~5. Luminaires with hardwired high frequency generator and induction lamp.~~ ~~6. Ceiling Fan Light Kits that are subject to federal appliance regulations.~~	~~7. All light sources installed in ceiling recessed downlight luminaires. Note that ceiling recessed downlight luminaires shall not have screw base sockets regardless of lamp type as specified in Section 150.0(k)1C.~~ ~~8. Any light source not otherwise listed in this table.~~

Multifamily Buildings

TABLE 180.2-E Control Requirements for Indoor Lighting System Alterations for Common Use Areas

Control Specifications	Projects complying with Section 180.2(b)4Biva	Projects complying with Sections 180.2(b)4Bivb or 180.2(b)4Bivc
Manual Area Controls 160.5(b)4Ai	Required	Required
Manual Area Controls 160.5(b)4Aii	Required	Required
Manual Area Controls 160.5(b)4Aii	Only required for new or completely replaced circuits	Only required for new or completely replaced circuits
Multi-Level Controls 160.5(b)4B	Required	Not Required
Automatic Shut Off Controls 160.5(c)4Ci	Required; 160.5(b)4Cid only required for new or completely replaced circuits	Required; 160.5(b)4Cid only required for new or completely replaced circuits
Automatic Shut Off Controls 160.5(c)4Cii	Required	Required
Automatic Shut Off Controls 160.5(c)4Ciii	Required	Required
Automatic Shut Off Controls 160.5(c)4Civ	Required	Required
Automatic Shut Off Controls 160.5(b)4Cv	Required	Required
Automatic Shut Off Controls 160.5(b)4Cvi	Required	Required ; except for 160.5(b)4Cvib
Automatic Shut Off Controls 160.5(b)4Cvii	Required	Required
Daylighting Controls 160.5(b)4D	Required	Not Required
Demand Responsive Controls ~~160.5(b)4E~~ 110.12(a) and 110.12(c)	Required	Not Required

Appendix 2: Proposed 2025 Title 24 Lighting Language

Nonresidential Mandatory Requirements

Manual Area Controls

(a) Manual Control

Each enclosed space shall provide lighting control(s) that allow the lighting in that enclosed space to be manually turned on and off. The manual control shall:

1. Be readily accessible to occupants of the enclosed space; and

   EXCEPTION to Section 130.1(a)1: Restrooms having two or more stalls, parking areas, stairwells, corridors, and areas of the building intended for access or use by the public may use a manual control not accessible to unauthorized personnel.

2. Be located in the enclosed space OR be located such that the controlled lighting/visual display can be seen when operating the controls.

   EXCEPTION to Section 130.1(a)2: Healthcare facilities.

3. Provide separate control of general, floor display, wall display, window display, case display, ornamental, and special effects lighting, such that each type of lighting can be turned on or off without turning on or off other types of lighting, Scene controllers may comply with this requirement provided that at least one scene turns on general lighting only, and the control provides a means to manually turn off all lighting.

EXCEPTION to Section 130.1(a): Up to 0.1 watts per square foot of indoor lighting may be continuously illuminated to allow for means of egress illumination consistent with California Building Code Section 1008. Egress lighting complying with this wattage limitation is not required to comply with manual control requirements if:

1. The area is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1; and

2. The controls for the egress lighting are not accessible to unauthorized personnel.

Multilevel Lighting Controls

(b) Multilevel Lighting Controls.

The general lighting of any enclosed space 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot shall provide multilevel lighting controls that allow the level of lighting to be adjusted up and down and maintain illuminance uniformity by providing continuous dimming from 10-100 percent power.

EXCEPTION 1 to Section 130.1(b): An enclosed space that has only one luminaire.
EXCEPTION 2 to Section 130.1(b): Restrooms.
EXCEPTION 3 to Section 130.1(b): Healthcare facilities.

Shut-OFF 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.

EXCEPTION 1 to Section 130.1(c): Healthcare facilities.

EXCEPTION 2 to Section 130.1(c): Up to 0.1 watts per square foot of lighting in any area within a building may be continuously illuminated, provided that the area is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1. Lighting providing means of egress illumination, as the term is used in the California Building Code, shall be configured to provide no less than the amount of light required by California Building Code Section 1008 while in the partial-off mode.

1. All installed indoor lighting shall be equipped with controls that meet the following requirements:

A. Shall be controlled with an occupant sensing control set to no more than a 20 minute time delay, automatic time-switch control, or other control capable of automatically shutting OFF all of the lighting when the space is typically unoccupied; and

B. Separate controls for the lighting on each floor, other than lighting in stairwells; and

C. Separate control zones for a space enclosed by ceiling height partitions shall not exceed 5,000 square feet.

EXCEPTION to Section 130.1(c)1C: The area controlled may not exceed 20,000 square feet in the following function areas: Malls, auditoriums, single tenant retail, industrial, convention centers, and arenas.

EXCEPTION 1 to Section 130.1(c)1: Where the lighting is serving an area that is in continuous use, 24 hours per day/365 days per year.

EXCEPTION 2 to Section 130.1(c)1: Lighting complying with Section 130.1(c)5 or 7.

EXCEPTION 3 to Section 130.1(c)1: Electrical equipment rooms subject to Article 110.26(D) of the California Electrical Code.

EXCEPTION 4 to Section 130.1(c)1: Illumination provided by lighting equipment that is intended to function in emergency mode only when normal power is absent.

2. Countdown timer switches may be used to comply with the automatic shut-OFF…

…control requirements in Section 130.1(c)1 only in closets less than 70 square feet, and server aisles in server rooms. The maximum timer setting shall be 10 minutes for closets, and 30 minutes for server aisles.

3. If an automatic time-switch control…

… is installed to comply with Section 130.1(c)1, it shall incorporate a manual override lighting control that it allows the lighting to remain ON for no more than 2 hours when an override is initiated.

EXCEPTION 1 to Section 130.1(c)3: Areas where occupancy sensing controls are installed.

EXCEPTION 2 to Section 130.1(c)3: In the following function areas, the override time may exceed 2 hours: Malls, auditoriums, single tenant retail, industrial, laboratories and arenas where captive-key override is utilized.

4. If an automatic time-switch control…

… is installed to comply with Section 130.1(c)1, it shall incorporate an automatic holiday "shut-OFF" feature that turns OFF all loads for at least 24 hours, and then resumes the normally scheduled operation.

EXCEPTION 1 to Section 130.1(c)4: Areas where occupancy sensing controls are installed.

EXCEPTION 2 to Section 130.1(c)4: Holiday shut-OFF controls are not required in retail stores, malls, restaurants, grocery stores, churches, and theaters.

5. Areas requiring an Occupant Sensing Control

In offices 250 square feet or smaller, multipurpose rooms of less than 1,000 square feet, classrooms of any size, conference rooms of any size, and restrooms of any size, lighting shall be controlled with occupant sensing controls to automatically shut OFF all of the lighting in 20 minutes or less after the space is unoccupied.

The occupant sensing controls shall function either as a:

A. Partial-ON Occupant Sensing Controls capable of automatically activating between 50-70 percent of controlled lighting power, or

B. Vacancy Sensing Controls, where all lighting responds to a manual ON input only.

In addition, controls shall be provided that allow the lights to be manually shut-OFF in accordance with Section 130.1(a) regardless of the sensor status.

EXCEPTION to 130.1(c)5: Lighting in restrooms shall be permitted to be controlled with full-on/full-off occupant sensing controls.

6. Full or Partial OFF occupant sensing controls are required for warehouse aisle ways, warehouse open areas, corridors, stairwells, and offices greater than 250 square feet.

Lighting installed in the following areas shall meet the requirements below .

A. In aisle ways and open areas in warehouses, lighting shall be controlled with occupant sensing controls that automatically reduce lighting power 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.

B. In corridors and stairwells (including library stack aisles 10 feet or more), lighting shall be controlled by occupant sensing controls that separately reduce the lighting power 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 from all designed paths of egress.

C. In office spaces greater than 250 square feet, general lighting shall be controlled with occupant sensing controls that meet all of the following:

i. The occupant sensing controls shall be configured so that lighting shall be controlled separately in control zones not greater than 600 square feet. and

ii. In 20 minutes or less after the control zone is unoccupied, the occupant sensing controls shall uniformly reduce lighting power in the control zone to by at least 80 percent of full power. Control functions that switch control zone lights completely off when the zone is vacant meet this requirement; and

iii. In 20 minutes or less after the entire office space is unoccupied, the occupant sensing controls shall automatically turn off lighting in all control zones in the space; and

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

7. Parking garage controls.

In parking garages, parking areas and loading and unloading areas, general lighting shall be controlled by occupant sensing controls having at least one control step between 20 percent and 50 percent of design lighting power. No more than 500 watts of rated lighting power shall be controlled together as a single zone. A reasonably uniform level of illuminance shall be achieved in accordance with the applicable requirements in TABLE 130.1-A. 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 from all designed paths of egress.

Interior areas of parking garages are classified as indoor lighting for compliance with Section 130.1(c)7B. Parking areas on the roof of a parking structure are classified as outdoor hardscape and shall comply with the applicable provisions in Section 130.2.

8. Hotel motel guest rooms…

…shall be controlled with one of the following such that, no longer than 20 minutes after the guest room has been vacated, lighting power is switched off

i. captive card key controls; or

ii. occupant sensing controls; or

iii. other automatic controls.

EXCEPTION to Section 130.1(c)8: One high efficacy luminaire as defined in TABLE 150.0-A that is switched separately and where the switch is located within 6 feet of the entry door.

Automatic Daylighting Controls

(d) Daylight Responsive Controls.

Any general lighting luminaire that is at least 50 percent in skylit daylit zones, primary sidelit daylit zones, or 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 to keep the total light level stable as the amount of incoming daylight changes. 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.

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.

2. The daylight responsive 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 and other solid state lighting (SSL) light sources in linear form may be treated as linear lamps in increments of four feet segments or smaller, and each segment is separately controlled based on the type of the daylit zone the segment is primarily located.

3. The daylight responsive 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 and allow the multilevel lighting control to adjust the level of lighting;

   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 daylit zones shall be turned off.

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.

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): Areas where the combined total installed wattage of the general lighting located at least 50 percent in the skylit daylight zone, primary sidelit daylit zones, or secondary sidelit daylight zone is less than 120 watts are not required to have daylighting controls for those zones.

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 daylight responsive controls.

EXCEPTION 5 to Section 130.1(d): Areas 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 6 to Section 130.1(d): For parking garages, luminaires located in the daylight adaptation zone.

EXCEPTION 7 to Section 130.1(d): Luminaires in sidelit daylit zones in retail merchandise sales.

Demand Responsive Controls
130.1(e) Demand Responsive Controls.

See Section 110.12 for requirements for demand responsive lighting controls.

SECTION 110.12 – MANDATORY REQUIREMENTS FOR DEMAND MANAGEMENT

Buildings, other than healthcare facilities, that install or are required to install demand responsive controls shall comply with the applicable demand responsive control requirements of Sections 110.12(a) through 110.12(e).

(a) Demand responsive controls.

1. All demand responsive controls shall be either:

   A. A certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node (VEN), as specified under Clause 11, Conformance, in the applicable OpenADR 2.0 Specification; or

   B. Certified by the manufacturer as being capable of responding to a demand response signal from a certified OpenADR 2.0b Virtual End Node by automatically implementing the control functions requested by the Virtual End Node for the equipment it controls.

2. All demand responsive controls shall be capable of communicating with the VEN using a wired or wireless bi-directional communication protocol.

3. RESERVED

4. When the demand response signal is communications are disabled or unavailable, all demand responsive controls shall continue to perform all other control functions provided by the demand responsive control.

5. Demand responsive control thermostats shall comply with Reference Joint Appendix 5 (JA5), Technical Specifications For Occupant Controlled Smart Thermostats.

(b) Demand Responsive Zonal HVAC Controls.

Nonresidential HVAC systems with DDC to the Zone level shall be programmed to allow centralized demand shed for noncritical zones as follows:

1. The controls shall have a capability to remotely increase the operating cooling temperature set points by 4° or more in all noncritical zones on signal from a centralized contact or software point within an Energy Management Control System (EMCS).

2. The controls shall have a capability to remotely decrease the operating heating temperature set points by 4° or more in all noncritical zones on signal from a centralized contact or software point within an EMCS.

3. The controls shall have capabilities to remotely reset the temperatures in all noncritical zones to original operating levels on signal from a centralized contact or software point within an EMCS.

4. The controls shall be programmed to provide an adjustable rate of change for the temperature increase, decrease, and reset.

5. The controls shall have the following features:

A. Disabled. Disabled by authorized facility operators; and

B. Manual control. Manual control by authorized facility operators to allow adjustment of heating and cooling set points globally from a single point in the EMCS; and

C. Automatic Demand Shed Control. Upon receipt of a demand response signal, the space-conditioning systems shall conduct a centralized demand shed, as specified in Sections 110.12(b)1 and 110.12(b)2, for noncritical zones during the demand response period.

(c) Demand Responsive Lighting Controls

Buildings with nonresidential lighting systems having a total installed lighting power of 4,000 watts or greater that is subject to the requirements of Section 130.1(b) shall

install controls that are capable of automatically reducing lighting power in response to a Demand Response Signal.

1. For compliance testing, the lighting controls shall demonstrate a 15 percent or greater reduction in lighting power as described in NA7.6.3.

2. For buildings where demand response controls are required, demand responsive controls shall control the general lighting in the spaces required to meet the requirements of Section 130.1(b).

3. General lighting shall be reduced in a manner consistent with the uniform level of illumination requirements in TABLE 130.1-A.

EXCEPTION to 110.12(c): Spaces where a health or life safety statute, ordinance, or regulation does not permit the general lighting to be reduced are not required to install demand responsive controls and do not count toward the 4,000 watt threshold.

(d) Demand Responsive Electronic Message Center Control.

Controls for electronic message centers greater than 15 kW shall be capable of reducing the lighting power by a minimum of 30 percent when receiving a demand response signal.

EXCEPTION to Section 110.12(d): Electronic message centers that are not permitted by a health or life safety statute, ordinance, or regulation to be reduced.

(e) Demand Responsive Controlled Receptacles.

Controlled receptacles in buildings shall be capable of automatically turning off all loads connected to the receptacle in response to a demand response signal.

Exception 1 to 110.12(e): Spaces without demand responsive lighting controls.

Exception 2 to 110.12(e): Spaces where a health or life safety statute, ordinance, or regulation does not permit the receptacles to be automatically controlled.

Control Interactions

(f) Control Interactions.

Each lighting control installed to comply with Section 130.1(a) through(e) shall permit or incorporate the functions of the other lighting controls.

1. For general lighting, the manual area control (Section 130.1(a)) shall permit the light level to be adjusted by the multilevel controls (Section 130.1(b)), shutoff controls (Section 130.1(c)), daylight responsive controls (Section 130.1(d)), and demand responsive controls (Section 130.1(e)).

2. The manual area controls (Section 130.l(a)) shall permit the shutoff controls (Section 130.1(c)) to adjust the light level.

3. The multilevel lighting control (Section 130.1(b)) shall permit the daylight responsive controls (Section 130.1(d)) to adjust the electric lighting level in response to changes in the amount of daylight in the daylit zone.

4. The multilevel lighting control (Section 130.1(b)) shall permit the demand responsive controls (Section 130.1(e)) to adjust the lighting during a demand response event and to return it to the level set by the multilevel lighting control after the event.

5. The shutoff control (Section 130.1(c)) shall permit the manual area control (Section 130.1(a)) to turn the lighting on. If the on request occurs while an automatic time switch control would turn the lighting off, then the on request shall be treated as an override request consistent with Section 130.1(c)3.

6. The daylight responsive controls (Section 130.1(d)) shall permit the multilevel lighting controls (Section 130.1(b)) to override the light level.

7. For lighting controlled by multilevel lighting controls (Section 130.1(b))and by occupant sensing controls that provide an automatic-on function (Section 130.1(c)6 and Section 130.1(c)7), the controls shall provide a partial-on function that is capable of automatically activating between 50-70 percent of controlled lighting power.

   Exception to 130.1(f)7: Office areas greater than 250 square feet can be dimmed to any power level.

8. RESERVED

9. For space conditioning system zones serving only spaces that are required to have occupant sensing controls as specified in Section 130.1(c)5, 6 and 7, and where Table 120.1-A allows the ventilation air to be reduced to zero when the space is in occupied-standby mode, the space conditioning system shall be controlled by occupancy sensing controls as specified in Section 120.2(e)3.

TABLE 130.1-B: Control Interactions Requirements

If using (down) …then allow (right) to override light level.	**Manual Controls**	**Multilevel Lighting Controls**	**Shutoff Controls**	**Daylight Responsive Controls**	**Demand Responsive Controls**
Manual Controls		Yes, dim only.	Yes, dim or off.	Yes, in response to daylight levels in daylight zone.	Yes, during DR event only.
Multilevel Lighting Controls				Yes, in response to daylight levels in daylight zone.	Yes, during DR event only.
Shutoff Controls	Yes				
Daylight Responsive Controls		Yes, dim only.			
Demand Responsive Controls					
Multilevel Lighting Controls & Partial-On Occupancy Sensors		Yes, dim to 50-70 percent.	Yes, dim to 50-70 percent.		

Outdoor Lighting

(b) Luminaire Shielding Requirements.

All outdoor luminaires of 6,200 initial luminaire lumens or greater, shall comply with Backlight, Uplight, and Glare (BUG) in accordance with ANSI/IES TM-15-20, Annex A requirements in accordance with Table 130.2-A.

TABLE 130.2-A MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS

TABLE 5.106.8 [N] MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS[1,2]

ALLOWABLE RATING	LIGHTING ZONE LZ0	LIGHTING ZONE LZ1	LIGHTING ZONE LZ2	LIGHTING ZONE LZ3	LIGHTING ZONE LZ4
Maximum Allowable Backlight Rating (B)					
Luminaire greater than 2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	N/A	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	N/A	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	B0	B0	B1	B2
Maximum Allowable Uplight Rating (U)					
For area lighting[3]	N/A	U0	U0	U0	U0
For all other outdoor lighting, including decorative luminaires	N/A	U1	U2	U3	U4
Maximum Allowable Glare Rating (G)					
Luminaire greater than 2 MH from property line	N/A	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	N/A	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	N/A	G0	G0	G1	G1
Luminaire front hemisphere is less than 0.5 MH from property line	N/A	G0	G0	G0	G1

1. IESNA Lighting Zones 0 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.
2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.
3. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet *U*-value limits for "all other outdoor lighting."

EXCEPTION 1 to Section 130.2(b): Signs.

EXCEPTION 2 to Section 130.2(b): Lighting for building facades, public monuments, public art, statues, and vertical surfaces of bridges.

EXCEPTION 3 to Section 130.2(b): Lighting not permitted by a health or life safety statute, ordinance, or regulation to be a cutoff luminaire.

EXCEPTION 4 to Section 130.2(b): Temporary outdoor lighting**.**

EXCEPTION 5 to Section 130.2(b): Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:

A. Where the existing luminaire does not meet the luminaire BUG requirements in Section 130.2(b); and

B. Spacing between existing poles is greater than six times the mounting height of the existing luminaires; and

C. Where no additional poles are being added to the site; and

D. Where new wiring to the luminaires is not being installed; and

E. Provided that the connected lighting power wattage is not increased.

EXCEPTION 6 to Section 130.2(b): Luminaires that illuminate the public right of way ~~on~~ including publicly--maintained or utility-maintained roadways, sidewalks, and bikeways.

EXCEPTION 7 to Section 130.2(b): Outdoor lighting attached to a hotel/motel building and separately controlled from the inside of a guest room.

(c) Controls for Outdoor Lighting.

Outdoor lighting shall be independently controlled from other electrical loads, and the controls for outdoor lighting shall meet the following functional requirements:

EXCEPTION 1 to Section 130.2(c): Outdoor lighting not permitted by a health or life safety statute, ordinance, or regulation to be turned OFF or reduced.

EXCEPTION 2 to Section 130.2(c): Lighting in tunnels required to be illuminated 24 hours per day and 365 days per year.

1. **Daylight Availability.** All installed outdoor lighting shall be controlled by a photo control, astronomical time-switch control, or other control capable of automatically shutting OFF the outdoor lighting when daylight is available.

2. **Automatic Scheduling Controls.**

   A. Automatic scheduling controls shall be installed for all outdoor lighting. Automatic Scheduling Controls may be installed in combination with motion sensing controls or other outdoor lighting controls.

   B. Automatic scheduling controls shall be capable of reducing the outdoor lighting power by at least 50 percent, and separately capable of turning the lighting OFF, during scheduled unoccupied periods.

   C. Automatic scheduling controls shall allow scheduling of a minimum of two nighttime periods with independent lighting levels and may include an override function that turns lighting ON during its scheduled dim or OFF state for no more than two hours when an override is initiated.

3. **Motion Sensing Controls.**

   A. Motion sensing controls shall be installed for the following luminaires where the bottom of the luminaire is mounted 24 feet above grade or lower.

i. Outdoor luminaires providing general lighting for general hardscape, Outdoor Sales Lot, Vehicle Service Station Canopies, and Vehicle Service Station Hardscape applications; and,

ii. Wall packs (bilaterally symmetric outdoor wall mounted luminaire) providing general lighting for Building Façade, Ornamental Hardscape or Outdoor Dining.

B. Motion sensing controls shall be capable of reducing the outdoor lighting power of each controlled luminaire by at least 50 percent after the area has been vacated.

C. Motion sensing controls shall be capable of reducing the lighting to its dim or OFF state no longer than 15 minutes after the area has been vacated, and of returning the lighting to its ON state when the area becomes occupied.

D. No more than 1,500 watts of lighting power shall be controlled by a single sensor or as a single zone.

EXCEPTION 1 to Section 130.2(c)3: Luminaires with a maximum rated wattage of 40 watts each are not required to have motion sensing controls.

EXCEPTION 2 to Section 130.2(c)3: Luminaires providing lighting for the following applications are not required to have motion sensing controls:

A. Outdoor Sales Frontage applications

B. Applications listed as Exceptions to Section 140.7(a)

EXCEPTION 3 to Section 130.2(c)3: Lighting subject to a health or life safety statute, ordinance, or regulation may have a minimum time-out period longer than 15 minutes or a minimum dimming level above 50 percent when necessary to comply with the applicable law.

Controlled Environment Horticulture Lighting

TABLE 100.0-A APPLICATION OF STANDARDS

Occupancies	Application	Mandatory	Prescriptive	Performance	Additions/Alterations
All Buildings	General	100.0, 100.1, 100.2, 110.0	100.0, 100.1, 100.2, 110.0	100.0, 100.1, 100.2, 110.0	100.0, 100.1, 100.2, 110.0
Nonresidential, And Hotels/Motels	General	120.0	140.0, 140.2	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Envelope (conditioned)	110.6, 110.7, 110.8,120.7	140.3	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Envelope (unconditioned process spaces)	N.A.	140.3(c)	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	HVAC (conditioned)	110.2, 110.5, 120.1, 120.2, 120.3, 120.4, 120.5, 120.8	140.4	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Water Heating	110.3, 120.3, 120.8, 120.9	140.5	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Indoor Lighting (conditioned, process spaces)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6	140.0, 140.1	141.0
Nonresidential, And Hotels/Motels	Indoor Lighting (unconditioned and parking garages)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6	N.A.	141.0
Nonresidential, And Hotels/Motels	Outdoor Lighting	110.9, 130.0, 130.2, 130.4	140.7	N.A.	141.0
Nonresidential, And Hotels/Motels	Electrical Power Distribution	110.11, 130.5	N.A.	N.A.	141.0
Nonresidential, And Hotels/Motels	Pool and Spa Systems	110.4, 110.5, 150.0(p)	N. A.	N.A.	141.0
Nonresidential, And Hotels/Motels	Solar Ready Buildings	110.10	N.A.	N.A.	141.0(a)
Nonresidential, And Hotels/Motels	Solar PV and Battery Storage Systems	N.A.	140.10	140.0, 140.1	N.A.
Covered Processes[1]	Controlled Environment Horticulture, Envelope, Ventilation, Process Loads	110.2, 120.6	140.9	140.1	120.6, 140.9, 141.1
Signs	Indoor and Outdoor	110.9, 130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H
Single-Family	General	150.0	150.1(a, c)	150.1(a), 150.1(b)	150.2(a), 150.2(b)
Single-Family	Envelope (conditioned)	110.6, 110.7, 110.8, 150(a), 150.0(b), 150.0(c), 150.0(d), 150.0(e), 150.0(g), 150.0(q)	150.1(a, c)	150.1(a), 150.1(b)	150.2(a), 150.2(b)

120.6(h) Mandatory Requirements for Controlled Environment Horticulture (CEH) Spaces

1. **Indoor Growing, Dehumidification.** Dehumidification equipment shall be one of the following:

A. Dehumidifiers subject to regulation under federal appliance standards tested in accordance with 10 CFR 430.23(z) and Appendix X or X1 to Subpart B of 10 CFR Part 430 as applicable, and complying with 10 CFR 430.32(v)2;

B. Integrated HVAC system with on-site heat recovery designed to fulfill at least 75 percent of the annual energy for dehumidification reheat;

C. Chilled water system with on-site heat recovery designed to fulfill at least 75 percent of the annual energy for dehumidification reheat; or

D. Solid or liquid desiccant dehumidification system for system designs that require dewpoint of 50°F or less.

2. **Indoor Growing, Electrical Power Distribution Systems.** Electrical power distribution system serving CEH spaces shall be designed so that a measurement device is capable of monitoring the electrical energy usage of aggregate horticultural lighting load.

3. **Indoor Growing and Greenhouses, Horticultural Lighting.** In a building with CEH spaces or in a greenhouse with more than 40 kW of aggregate horticultural lighting load, the electric lighting system used for plant growth and plant maintenance shall meet the following requirements:

A. The horticultural lighting systems shall have a photosynthetic photon efficacy (PPE) rated in accordance with ANSI/ASABE S640 for wavelengths from 400 to 700 nanometers and meet one of the following requirements in Table 120.6-F.

TABLE 120.6-F: HORTICULTURE LIGHTING -- MINIMUM PPE REQUIREMENTS

Luminaire Type	PPE for Indoor Growing Applications (micromoles per joule)	PPE for Greenhouse Applications (micromoles per joule)
Luminaires, Integrated/Non-serviceable	1.9	1.7
Luminaires, Removable/Serviceable Lamps	1.9	1.7

B. Time-switch lighting controls shall be installed and comply with Section 110.9(b)1, Section 130.4(a)4, applicable sections of Reference Nonresidential Appendix NA7.6.2.

C. Multilevel lighting controls shall be installed and comply with Section 130.1(b).

4. **Conditioned Greenhouses, Building Envelope.** Conditioned greenhouses shall meet the following requirements:

A. Opaque wall and opaque roof assembly shall meet the requirements of Section 120.7; and

B. Non-opaque envelopes shall have two or more glazings separated by either air or gas fill.

5. **Conditioned Greenhouses, Space-Conditioning Systems.** Space-conditioning systems used for plant production shall comply with all applicable requirements.

141.1(c) Controlled Environment Horticulture Spaces.

1. Indoor Growing, Space-Conditioning Systems and Dehumidification. All newly installed heating, ventilation, air conditioning systems or dehumidification systems in buildings with indoor growing shall meet the applicable requirements of Section 120.6(h)1 and 120.6(h)2.

2. Greenhouses, Building Envelope and Space-Conditioning Systems. A greenhouse being converted to a conditioned greenhouse or additions to a conditioned greenhouse shall meet the requirements of Sections 120.6(h5 and 120.6(h)6.

3. Indoor Growing and Greenhouses, Horticultural Lighting. When alterations to horticultural lighting systems increase lighting wattage or include adding, replacing, or altering 10 percent or more of the horticultural luminaires serving an enclosed space, the newly installed, replaced, or altered lighting shall meet the requirements of Section 120.6(h)3 for indoor growing or Section 120.6(h)7 for greenhouses.

EXCEPTION to Section 141.1(c)3: Any alteration limited to adding lighting controls or replacing lamps, ballasts, or drivers.

NOTE: For alterations that change the occupancy classification of the building, the requirements of Section 141.1 apply to the occupancy that will exist after the alterations.

Electrical Power Distribution

(d) Circuit Controls for 120-Volt Receptacles and Controlled Receptacles.

In all buildings, both controlled and uncontrolled 120 volt receptacles shall be provided in office areas, lobbies, conference rooms, kitchen areas in office spaces, and copy rooms. Additionally, hotel/motel guest rooms shall comply with Section 130.5(d)4. Controlled receptacles shall meet the following requirements, as applicable:

1. Install a control capable of automatically shutting OFF the controlled receptacles when the space is typically unoccupied, either at the receptacle or circuit level. When an automatic time switch control is installed it shall incorporate an override control that allows the controlled receptacle to remain ON for no more than 2 hours when an override is initiated and an automatic holiday "shut-OFF" feature that turns OFF all loads for at least 24 hours and then resumes the normally scheduled operation. Countdown timer switches shall not be used to comply; and

2. Install at least one controlled receptacle within 6 feet from each uncontrolled receptacle or install a multiple receptacle device with at least one controlled and one uncontrolled receptacle. Where receptacles are installed in modular furniture in open office areas, at least one controlled receptacle shall be installed at each workstation; and

3. Provide a permanent marking for controlled receptacles or circuits to differentiate them from uncontrolled receptacles or circuits; and

4. For hotel and motel guest rooms, install controlled receptacles for at least one-half of the 120-volt receptacles in each guest room. Electric circuits serving controlled receptacles in guest rooms shall have captive card key controls, occupant sensing controls, or automatic controls so the power is switched off no longer than 30 minutes after the guest room has been vacated.

EXCEPTION 1 to Section 130.5(d): Receptacles that are only for the following purposes:

i. Receptacles specifically for refrigerators and water dispensers in kitchen areas.

ii. Receptacles located a minimum of six feet above the floor that are specifically for clocks.

iii. Receptacles for network copiers, fax machines, A/V and data equipment other than personal computers in copy rooms.

iv. Receptacles on circuits rated more than 20 amperes.

v. Receptacles connected to an uninterruptible power supply (UPS) that are intended to be in continuous use, 24 hours per day/365 days per year, and are marked to differentiate them from other uncontrolled receptacles or circuits.

EXCEPTION 2 to Section 130.5(d): Receptacles in healthcare facilities.

Nonresidential Prescriptive Requirements

Sign Lighting

SECTION 140.8 – PRESCRIPTIVE REQUIREMENTS FOR SIGNS

This section applies to all internally illuminated and externally illuminated signs, unfiltered light emitting diodes (LEDs), and unfiltered neon, both indoor and outdoor. Each sign shall comply with either Subsection (a) or (b), as applicable.

(a) Maximum Allowed Lighting Power.

1. For internally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 12 watts per square foot. For double-faced signs, only the area of a single face shall be used to determine the allowed lighting power.

2. For externally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 2.3 watts per square foot. Only areas of an externally lighted sign that are illuminated without obstruction or interference, by one or more luminaires, shall be used.

3. Lighting for unfiltered light emitting diodes (LEDs) and unfiltered neon shall comply with Section 140.8(b).

(b) Alternate Lighting Sources

The sign shall be equipped with one or more of the following light sources:

1. Neon or cold cathode lamps with transformer or power supply efficiency greater than or equal to the following:

   A. A minimum efficiency of 75 percent when the transformer or power supply rated output current is less than 50 mA; or

   B. A minimum efficiency of 68 percent when the transformer or power supply rated output current is 50 mA or greater.

The ratio of the output wattage to the input wattage is at 100 percent tubing load.

2. Light emitting diodes (LEDs) with a power supply having an efficiency of 80 percent or greater

EXCEPTION to Section 140.8(b)2: Single voltage external power supplies that are designed to convert 120 volt AC input into lower voltage DC or AC output, and have a nameplate output power less than or equal to 250 watts, shall comply with the applicable requirements of the Appliance Efficiency Regulations (Title 20).

EXCEPTION 1 to Section 140.8: Unfiltered incandescent lamps that are not part of an electronic message center (EMC), an internally illuminated sign or an externally illuminated sign.

EXCEPTION 2 to Section 140.8: Exit signs. Exit signs shall meet the requirements of the Appliance Efficiency Regulations.

EXCEPTION 3 to Section 140.8: Traffic Signs. Traffic signs shall meet the requirements of the Appliance Efficiency Regulations.

Lighting Power Allowances

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

Option 1: Remove Tailored Method and add Additional Allowances to Area Category

140.6(b) Calculation of Allowed Indoor Lighting Power: General Rules.

4. Allowed Indoor Lighting Power 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; precision commercial and industrial work; white board or chalk board; accent, display and feature; decorative; valuable display case or Videoconferencing Studio; may not be increased as a result of, or otherwise traded off against, decreasing any other allotment; and

140.6(c). Calculation of Allowed Indoor Lighting Power: Specific Methodologies.

The allowed indoor lighting power for each building type, or each primary function area shall be calculated using only one of the methods in Subsection 1 or 2 below as applicable.

2. Area Category Method.

G. In addition to the allowed indoor lighting power calculated according to Sections 140.6(c)2A through F, the building may add additional lighting power allowances for qualifying lighting systems as specified in the Qualifying Lighting Systems column in TABLE 140.6-C under the following conditions:

i. Only primary function areas having a lighting system as specified in the Qualifying Lighting Systems column in TABLE 140.6-C and in accordance with the corresponding footnote of the TABLE shall qualify for the additional lighting power allowances; 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; and

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

Primary Function Area		Allowed Lighting Power Density for General Lighting (W/ft²)	Additional Lighting Power	
			Qualified Lighting Systems	Additional Allowance (W/ft², unless noted otherwise)
Aging Eye/Low-vision[11]	Corridor Area	0.70	Decorative/Display	0.30
	Dining	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Lobby, Main Entry	0.85	Decorative/Display	0.30
			Transition Lighting OFF at night[12]	0.95
			Tunable white or dim-to-warm[10]	0.10
	Lounge/Waiting Area	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Multipurpose Room	0.85	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Religious Worship Area	1.00	Decorative/Display	0.30

			Tunable white or dim-to-warm[10]	0.10
	Restroom	1.00	Decorative/Display	0.20
	Stairwell	0.80	Decorative/Display	0.30
Audience Seating Area		0.50	Decorative/Display	0.25
Auditorium Area		0.70	Decorative/Display	0.45
Auto Repair / Maintenance Area		0.55	Detailed Task Work[7]	0.20
Barber, Beauty Salon, Spa Area		0.70	Detailed Task Work[7]	0.30
			Decorative/Display	0.25
Civic Meeting Place Area		0.90	Decorative/Display	0.25
Classroom, Lecture, Training, Vocational Area		0.60	White or Chalk Board[1]	7 W/ft
Concourse and Atria Area		0.60	Decorative/Display	0.25
Convention, Conference, Multipurpose and Meeting Area		0.75	Decorative Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14'	0.25 2 W/ft 2.35 W/ft 2.66 W/ft 0.30 0.35 0.40
Copy Room		0.50	-	-
Corridor Area		0.40	Decorative/Display	0.25
Dining Area	Bar/Lounge and Fine Dining	0.45	Decorative Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' General Lighting Ceiling Height > 10'	0.35 1.25 W/ft 1.5 W/ft 1.7 W/ft 0.45 0.52 0.60 0.25
	Cafeteria/Fast Food	0.45	Decorative/Display	0.25
	Family and Leisure	0.40	Decorative/Display	0.25
Electrical, Mechanical, Telephone Rooms		0.40	Detailed Task Work[7]	0.20
Exercise/Fitness Center and Gymnasium Area		0.50	-	-
Financial Transaction Area		0.70	Decorative/Display	0.25
Healthcare Facility and Hospitals	Exam/Treatment Room	1.15	-	-
	Imaging Room	0.60	Decorative/Display	0.20
			Tunable white or dim-to-warm[10]	0.10
	Medical Supply Room	0.55	-	-
	Nursery	0.80	Tunable white or dim-to-warm[10]	0.10
	Nurse's Station	0.85	Tunable white or dim-to-warm[10]	0.10
			Detailed Task Work[7]	0.20
	Operating Room	1.90	-	-
	Patient Room	0.70	Decorative/Display	0.15
			Tunable white or dim-to-warm[10]	0.10
	Physical Therapy Room	0.75	Tunable white or dim-to-warm[10]	0.10
	Recovery Room	0.90	Tunable white or dim-to-warm[10]	0.10
Hotel Function Area		0.85	Decorative/Display	0.25
Kitchen/Food Preparation Area		0.95	-	-
Laboratory, Scientific		0.90	Specialized Task Work[8]	0.35
Laundry Area		0.45	-	-
Library	Reading Area	0.80	Decorative/Display	0.25
	Stacks Area	1.00	-	-
Lobby		0.70	Decorative Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14'	0.25 3 W/ft 3.5 W/ft 4 W/ft
Locker Room		0.45	-	-
Lounge, Breakroom, or Waiting Area		0.55	Decorative/Display	0.25

Manufacturing, Commercial & Industrial Work Area	Low Bay		0.60	Detailed Task Work[7]	0.20
	High Bay		0.65	Detailed Task Work[7]	0.20
	Precision		0.85	Precision Specialized Work[9]	0.70
Museum Area	Exhibition/Display		0.40	Decorative Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14'	0.45 11.2 W/ft 13.1 W/ft 14.9 W/ft 0.70 0.82 0.93
	Restoration Room		0.70	Detailed Task Work[7]	0.35
Office Area	> 250 square feet		0.60	Decorative/Display and Portable lighting for office areas[6]	0.20
	≤ 250 square feet		0.65		
Parking Garage Area	Parking Zone and Ramps		0.10	First ATM or Ticket Machine	100 W
				Additional ATM or Ticket Machine	50 W each
	Daylight Adaptation Zones[2]		1.00	-	-
Pharmacy Area			1.00	Specialized Task Work[8]	0.35
Retail Sales Area		Grocery Sales	1.00	Decorative Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' General Lighting Ceiling Height > 10'	0.35 6.6 W/ft 7.76 W/ft 8.8 W/ft 0.60 0.70 0.80 0.10
		Retail Merchandise Sales	0.95	Decorative Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' Valuable Display Case General Lighting Ceiling Height > 10'	0.35 9.5 W/ft 11.2 W/ft 12.7 W/ft 0.45 0.52 0.60 0.50 0.10
		Fitting Room	0.60	External Illuminated Mirror[5]	40 W/ea
				Internal Illuminated Mirror[5]	120 W/ea
Religious Worship Area			0.95	Decorative/Display	0.25
Restrooms			0.65	Decorative/Display	0.35
Stairwell			0.60	Decorative/Display	0.35
Storage, Commercial/Industrial		Warehouse	0.40	-	-
		Shipping & Handling	0.60	-	-
Sports Arena – Playing Area		Class I Facility[13]	2.25	-	-
Sports Arena – Playing Area		Class II Facility[13]	1.45	-	-
Sports Arena – Playing Area		Class III Facility[13]	1.10	-	-
Sports Arena – Playing Area		Class IV Facility[13]	0.75	-	-
Theater Area		Motion picture	0.50	Decorative/Display	0.25
Theater Area		Performance	0.80	Decorative/Display	0.25

Transportation Function	Baggage Area	0.40	-	-
	Ticketing Area	0.45	Decorative/Display	0.20
Videoconferencing Studio		0.90	Videoconferencing[14]	1.00
All other		0.40	-	-

Footnotes for this table are listed below.
1. White board or chalk board. – Directional lighting dedicated to a white board or chalk board.
2. Daylight Adaptation Zones shall be no longer than 66 feet from the entrance to the parking garage.
3. MH is the Mounting Height which is the height in feet above finished floor and bottom of the luminaire. If luminaires are mounted at more than one mounting height in the same space, the average mounting height shall be used to determine the additional allowance.
4. Reserved
5. Illuminated mirrors. Lighting shall be dedicated to the mirror.
6. Portable lighting in office areas includes under shelf or furniture-mounted supplemental task lighting qualifies when controlled by a time clock or an occupancy sensor.
7. Detailed task work – Lighting provides high level of visual acuity required for activities with close attention to small elements and/or extreme close-up work.
8. Specialized task work – Lighting provides for small-scale, cognitive or fast performance visual tasks; lighting required for operating specialized equipment associated with pharmaceutical/laboratorial activities.
9. Precision specialized work – Lighting for work performed within a commercial or industrial environment that entails working with low contrast, finely detailed, or fast-moving objects.
10. Tunable white luminaires capable of color change greater than or equal to 2000K CCT, or dim-to-warm luminaires capable of color change greater than or equal to 500K CCT, connected to controls that allows color changing of the luminaires.
11. Aging Eye/Low-vision areas can be documented as being designed to comply with the light levels in ANSI/IES RP-28 and are or will be licensed by local or state authorities for either senior long-term care, adult day care, senior support, and/or people with special visual needs.
12. Transition lighting OFF at night. Lighting power controlled by astronomical time clock or other control to shut off lighting at night. Additional LPD only applies to area within 30 feet of an exit. Not applicable to lighting in daylit zones.
13. Class I Facility is used for competition play for 5000 or more spectators. Class II Facility is used for competition play for up to 5000 spectators. Class III Facility is used for competition play for up to 2000 spectators. Class IV Facility is normally used for recreational play and there is limited or no provision for spectators.
14. The additional videoconferencing lighting power shall be allowed provided the videoconferencing studio meets all the requirements of Section 140.6(c)2Gvii.

Option 2: Remove Tailored and Add IECC Allowances to Area Category Method

140.6(b) Calculation of Allowed Indoor Lighting Power: General Rules.

4. Allowed Indoor Lighting Power 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; 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

140.6(c). Calculation of Allowed Indoor Lighting Power: Specific Methodologies.

The allowed indoor lighting power for each building type, or each primary function area shall be calculated using only one of the methods in Subsection 1 or 2 below as applicable.

2. Area Category Method.

G. In addition to the allowed indoor lighting power calculated according to Sections 140.6(c)2A through F, the building may add additional lighting power allowances for qualifying lighting systems as specified in the Qualifying Lighting Systems column in TABLE 140.6-C under the following conditions:

i. Only primary function areas having a lighting system as specified in the Qualifying Lighting Systems column in TABLE 140.6-C and in accordance with the corresponding footnote of the TABLE shall qualify for the additional lighting power allowances; 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; and

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

Primary Function Area		Allowed Lighting Power Density for General Lighting (W/ft²)	Additional Lighting Power	
			Qualified Lighting Systems	Additional Allowance (W/ft², unless noted otherwise)
Aging Eye/Low-vision[11]	Corridor Area	0.70	Decorative/Display	0.30
	Dining	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Lobby, Main Entry	0.85	Decorative/Display	0.30
			Transition Lighting OFF at night[12]	0.95
			Tunable white or dim-to-warm[10]	0.10
	Lounge/Waiting Area	0.80	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Multipurpose Room	0.85	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Religious Worship Area	1.00	Decorative/Display	0.30
			Tunable white or dim-to-warm[10]	0.10
	Restroom	1.00	Decorative/Display	0.20
	Stairwell	0.80	Decorative/Display	0.30
Audience Seating Area		0.50	Decorative/Display	0.25
Auditorium Area		0.57	Decorative/Display	0.55
Auto Repair / Maintenance Area		0.55	Detailed Task Work[7]	0.20
Barber, Beauty Salon, Spa Area		0.70	Detailed Task Work[7]	0.30
			Decorative/Display	0.25
Civic Meeting Place Area		0.90	Decorative/Display	0.25
Classroom, Lecture, Training, Vocational Area		0.60	White or Chalk Board[1]	7 W/ft
Concourse and Atria Area		0.60	Decorative/Display	0.25

Convention, Conference, Multipurpose and Meeting Area		0.88	Decorative/Display	0.55
Copy Room		0.50	-	-
Corridor Area		0.40	Decorative/Display	0.25
Dining Area	Bar/Lounge and Fine Dining	0.76	Decorative/Display	0.55
	Cafeteria/Fast Food	0.45	Decorative/Display	0.25
	Family and Leisure	0.40	Decorative/Display	0.25
Electrical, Mechanical, Telephone Rooms		0.40	Detailed Task Work[7]	0.20
Exercise/Fitness Center and Gymnasium Area		0.50	-	-
Financial Transaction Area		0.70	Decorative/Display	0.25
Healthcare Facility and Hospitals	Exam/Treatment Room	1.15	-	-
	Imaging Room	0.60	Decorative/Display	0.20
			Tunable white or dim-to-warm[10]	0.10
	Medical Supply Room	0.55	-	-
	Nursery	0.80	Tunable white or dim-to-warm[10]	0.10
	Nurse's Station	0.85	Tunable white or dim-to-warm[10]	0.10
			Detailed Task Work[7]	0.20
	Operating Room	1.90	-	-
	Patient Room	0.70	Decorative/Display	0.15
			Tunable white or dim-to-warm[10]	0.10
	Physical Therapy Room	0.75	Tunable white or dim-to-warm[10]	0.10
	Recovery Room	0.90	Tunable white or dim-to-warm[10]	0.10
Hotel Function Area		0.88	Decorative/Display	0.55
Kitchen/Food Preparation Area		0.95	-	-
Laboratory, Scientific		0.90	Specialized Task Work[8]	0.35
Laundry Area		0.45	-	-
Library	Reading Area	0.80	Decorative/Display	0.25
	Stacks Area	1.00	-	-
Lobby, Main Entry		0.80	Decorative/Display	0.66
Locker Room		0.45	-	-
Lounge, Breakroom, or Waiting Area		0.55	Decorative/Display	0.25
Manufacturing, Commercial & Industrial Work Area	Low Bay	0.60	Detailed Task Work[7]	0.20
	High Bay	0.65	Detailed Task Work[7]	0.20
	Precision	0.85	Precision Specialized Work[9]	0.70
Museum Area	Exhibition/Display	0.55	Decorative/Display	0.70
	Restoration Room	0.70	Detailed Task Work[7]	0.35
Office Area	> 250 square feet	0.60	Decorative/Display and Portable lighting for office areas[6]	0.20
	≤ 250 square feet	0.65		
Parking Garage Area	Parking Zone and Ramps	0.10	First ATM or Ticket Machine	100 W
			Additional ATM or Ticket Machine	50 W each
	Daylight Adaptation Zones[2]	1.00	-	-
Pharmacy Area		1.00	Specialized Task Work[8]	0.35

Retail Sales Area	Retail Merchandise Sales and Grocery	0.85	Decorative Initial Watts per Building Sales Display Retail 1 Sales Display Retail 2 Sales Display Retail 3 Sales Display Retail 4	0.55 750 W 0.40 0.40 0.70 1.00
	Fitting Room	0.60	External Illuminated Mirror[5]	40 W/ea
			Internal Illuminated Mirror[5]	120 W/ea
Religious Worship Area		0.75	Decorative/Display	0.55
Restrooms		0.65	Decorative/Display	0.35
Stairwell		0.60	Decorative/Display	0.35
Storage, Commercial/Industrial	Warehouse	0.40	-	-
	Shipping & Handling	0.60	-	-
Sports Arena – Playing Area	Class I Facility[13]	2.25	-	-
Sports Arena – Playing Area	Class II Facility[13]	1.45	-	-
Sports Arena – Playing Area	Class III Facility[13]	1.10	-	-
Sports Arena – Playing Area	Class IV Facility[13]	0.75	-	-
Theater Area	Motion picture	0.27	Decorative/Display	0.55
Theater Area	Performance	1.09	Decorative/Display	0.55
Transportation Function	Baggage Area	0.40	-	-
	Ticketing Area	0.45	Decorative/Display	0.20
Videoconferencing Studio		0.90	Videoconferencing[14]	1.00
All other		0.40	-	-

Footnotes for this table are listed below.

1. White board or chalk board. – Directional lighting dedicated to a white board or chalk board.
2. Daylight Adaptation Zones shall be no longer than 66 feet from the entrance to the parking garage.
3. Sales Display Retail 1: Sales area for all products not listed in Area 2, 3, or 4
   Sales Display Retail 2: Sales area for vehicles, sporting goods and small electronics
   Sales Display Retail 3: Sales area for furniture, clothing, cosmetics and artwork
   Sales Display Retail 4: Sales area for jewelry, crystal and china
4. Reserved
5. Illuminated mirrors. Lighting shall be dedicated to the mirror.
6. Portable lighting in office areas includes under shelf or furniture-mounted supplemental task lighting qualifies when controlled by a time clock or an occupancy sensor.
7. Detailed task work – Lighting provides high level of visual acuity required for activities with close attention to small elements and/or extreme close-up work.
8. Specialized task work – Lighting provides for small-scale, cognitive or fast performance visual tasks; lighting required for operating specialized equipment associated with pharmaceutical/laboratorial activities.
9. Precision specialized work – Lighting for work performed within a commercial or industrial environment that entails working with low contrast, finely detailed, or fast-moving objects.
10. Tunable white luminaires capable of color change greater than or equal to 2000K CCT, or dim-to-warm luminaires capable of color change greater than or equal to 500K CCT, connected to controls that allows color changing of the luminaires.
11. Aging Eye/Low-vision areas can be documented as being designed to comply with the light levels in ANSI/IES RP-28 and are or will be licensed by local or state authorities for either senior long-term care, adult day care, senior support, and/or people with special visual needs.
12. Transition lighting OFF at night. Lighting power controlled by astronomical time clock or other control to shut off lighting at night. Additional LPD only applies to area within 30 feet of an exit. Not applicable to lighting in daylit zones.
13. Class I Facility is used for competition play for 5000 or more spectators. Class II Facility is used for competition play for up to 5000 spectators. Class III Facility is used for competition play for up to 2000 spectators. Class IV Facility is normally used for recreational play and there is limited or no provision for spectators.
14. The additional videoconferencing lighting power shall be allowed provided the videoconferencing studio meets all the requirements of Section 140.6(c)2Gvii.

Option 3: Simplify Tailored Method Tables

140.6(a)4. Luminaire Classification and Power Adjustment.

C. Tailored Method Display Lighting Mounting Height Lighting Power Adjustment. For wall display luminaires or floor display luminaires meeting Tailored Method Section 140.6(c)3G and H and where the bottom of luminaires are 10 feet 7 inches and greater above the finished floor, the adjusted indoor lighting power of these luminaires shall be calculated by multiplying their maximum rated wattage and the appropriated mounting height adjustment factor as follows:

i. The adjustment factor is 0.85 for the luminaire mounting height greater than 10 feet 6 inches and less than 14 feet;

ii. the adjustment factor is 0.75 for the mounting height greater than 14 feet and less than 18 feet; and

iii. the adjustment factor is 0.7 for the mounting height greater than 18 feet.

Luminaire mounting height is the distance from the finished floor to the bottom of the luminaire. General lighting shall not qualify for a mounting height multiplier.

140.6(c)3. Calculation of allowed indoor lighting power: specific methodologies.

F. Determine allowed indoor lighting power allotments for general lighting for primary function areas listed in TABLE 140.6-D as follows:

i. Determine the room cavity ratio (RCR) for the area. The RCR shall be calculated as follows:

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

ii. Find the allowed General Lighting Power Density allotments in Column 2 of TABLE 140.6-D for the determined RCR value from item i.

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

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

G. Determine additional allowed power for wall display lighting as follows:

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

ii. 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 luminaires providing directional display light.)

iii. 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 within two feet of the ceiling or are taller than ten feet and (II) are permanently anchored to the floor.

iv. For wall display lighting where the bottom of the luminaire is greater than 10 feet 6 inches above the finished floor, the mounting height adjustment factor can be used to adjust the installed luminaire wattage as specified in Section 140.6(a)4C.

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

a. the "wall display lighting power density" determined in accordance with TABLE 140.6-D, multiplied by the wall display lengths determined in accordance with Item iii; and

b. The Adjusted Indoor Lighting Power used for the wall display lighting systems.

vi. Lighting internal to display cases that are attached to a wall or directly adjacent to a wall are counted as wall display lighting as specified in Section 140.6(c)3G. All other lighting internal to display cases are counted as floor display lighting as specified in

Section 140.6(c)3H, or as very valuable display case lighting as specified in Section 140.6(c)3J.

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

viii. For floor display lighting where the bottom of the luminaire is greater than 10.6 feet above the finished floor, multiply the floor display installed watts by the appropriate mounting height adjustment factor to calculate the Adjusted Indoor Lighting Power as specified in Section 140.6(a)4C.

TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES

Primary Function Area (specified RCR*)	**Allowed LPD for General Lighting (W/ft^2)**	**Additional Lighting Power**	
		Qualified Lighting Systems	**Additional Allowance**
Bar/ Lounge and Fine Dining Areas		Wall display lighting (W/ft)	1.25
RCR < 2.0	0.4	Floor Display & Task (W/ft^2)	0.45
2.0 < RCR <=3.5	0.5		
3.5 < RCR <=7.0	0.65		
7.0 < RCR	0.85	Decorative (W/ft^2)	0.35
Main Entry Lobby		Wall Display lighting (W/ft)	3.40
RCR < 2.0	0.4	Floor Display & Task (W/ft^2)	0.20
2.0 < RCR <=3.5	0.5		
3.5 < RCR <=7.0	0.65		
7.0 < RCR	0.85	Decorative (W/ft^2)	0.35
Museum Exhibit/ Display		Wall display lighting (W/ft)	11.20
RCR < 2.0	0.35	Floor Display & Task (W/ft^2)	0.70
2.0 < RCR <=3.5	0.40		
3.5 < RCR <=7.0	0.50	Decorative (W/ft^2)	0.35
7.0 < RCR	0.65	Valuable Display Case (W/sf-floor)	0.50
Religious Worship Area		Wall display lighting (W/ft)	1.3
RCR < 2.0	0.55	Floor Display & Task (W/ft^2)	0.40
2.0 < RCR <=3.5	0.70		
3.5 < RCR <=7.0	0.85	Decorative (W/ft^2)	0.35
7.0 < RCR	1.2	Valuable Display Case (W/sf-floor)	0.50
Retail Merchandise Sales		Wall Display Lighting (W/ft)	11.5
RCR < 2.0	0.80	Floor Display & Task	0.70

2.0 < RCR <=3.5	0.90	(W/ft²)	
3.5 < RCR <=7.0	1.25	Decorative (W/ft²)	0.35
7.0 < RCR	1.55	Valuable Display Case (W/sf-floor)	0.50

*RCR is the room cavity ratio of the enclosed space containing the primary function area and is calculated according to Section 140.6(c)3.F.i.

Power Adjustment Factors

140.6(a)2. Reduction of wattage through controls.

In calculating Adjusted Indoor Lighting Power, 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.

When used for determining PAFs for general lighting in offices, furniture mounted luminaires that comply with all 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, 0.2 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 installed watts as allowed by Section 140.6(a)2 for calculating the Adjusted Indoor Lighting Power. If only a portion of the wattage in a luminaire is controlled in accordance with Section 140.6(a)2, then only that portion of controlled wattage may be reduced in calculating Adjusted Indoor Lighting Power.

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. PAFs shall not be available for lighting controls required by Part 6.-A

H. To qualify for the PAF for daylight continuous dimming plus OFF control, the daylight control and controlled luminaires shall comply with Section 130.1(d), 130.4(a)3 and 130.4(a)7, and the daylight control shall be continuous dimming and shall additionally turn lights completely OFF when the daylight available in the daylit zone is greater than 150 percent of the illuminance received from the general lighting system at full power. The PAF shall apply to the luminaires in the primary sidelit daylit zone, secondary sidelit daylit zone and the skylit daylit zone.

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

i. The 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, or 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 an Institutional Tuning in TABLE 140.6-A, the tuned lighting system shall comply with all of the following requirements:

i. The lighting controls shall limit the maximum output or maximum power draw of the controlled lighting to 85 percent or less of full light output or full power draw; and

ii. The means of setting the limit is accessible only to authorized personnel; and

iii. The setting of the limit is verified by the acceptance test required by Section 130.4(a)7; and

iv. The construction documents specify which lighting systems shall have their maximum light output or maximum power draw set to no greater than 85% of full light output or full power draw.

K. To qualify for the PAF for a Demand Responsive Control in TABLE 140.6-A, the general lighting wattage receiving the PAF shall not be within the scope of Section 110.12(c) and a Demand Responsive Control shall meet all of the following requirements:

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

ii. General lighting shall be reduced in a manner consistent with uniform level of illumination requirements in TABLE 130.1-A.

L. To qualify for the PAFs for clerestory fenestration, horizontal slats, or light shelves in TABLE 140.6-A, the daylighting design shall meet the requirements in Section 140.3(d). The PAFs shall only apply to lighting in a primary or secondary sidelit daylit zone where continuous dimming daylighting controls meeting the requirements of Section 130.1(d) are installed.

TABLE 140.6-A LIGHTING POWER 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. Daylight Continuous Dimming plus OFF Control	Luminaires in skylit daylit zone or primary sidelit daylit zone or secondary sidelit daylit zone		0.10
2. Occupant Sensing Controls in Offices Larger than 250 square feet	One sensor controlling an area that is:	No larger than 125 square feet	0.30
		From 126 to 250 square feet	0.20
3.Institutional Tuning	Luminaires in non-daylit areas. Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.		0.10
	Luminaires in daylit areas. Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.		0.05
4. Demand Responsive Control	General lighting luminaires not in the scope of Section 110.12(c). If DR controls are required, then this PAF is not available for any lighting in the project. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF		0.05
5. Clerestory Fenestration	Luminaires in daylit areas adjacent to the clerestory. Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF.		0.05
6. Horizontal Slats	Luminaires in daylit areas adjacent to vertical fenestration with interior or exterior horizontal slats. Luminaires that qualify for daylight dimming plus OFF		0.05

	control may also qualify for this PAF.	
7.Light Shelves	Luminaires in daylit areas adjacent to clerestory fenestration with interior or exterior light shelves. This PAF may be combined with the PAF for clerestory fenestration. Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF	0.10

Acceptance Testing Requirements

Appendix NA7 – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes

7.1 Purpose and Scope

This appendix defines acceptance procedures that must be completed on certain controls and equipment before the installation is deemed to be in compliance with the Standards. These requirements apply to all newly installed equipment for which there are acceptance requirements in new and existing buildings. The procedures apply to nonresidential, high-rise residential, hotel/motel buildings and covered processes as defined by the California Energy Commission's Energy Efficiency Standards for Nonresidential Buildings (Standards). The purpose of the acceptance tests is to assure:

(a) The presence of equipment or building components according to the specifications in the compliance documents.

(b) Installation quality and proper functioning of the controls and equipment to meet the intent of the design and the Standards.

Modifications and additions to these acceptance requirements needed to improve clarity or to better ensure proper installation and functionality may be approved by the Energy Commission.

7.2 Introduction

Acceptance requirements are defined as implementation of targeted inspection checks and functional and performance testing to determine whether specific building components, equipment, systems, and interfaces between systems conform to the criteria set forth in the Standards. Acceptance requirements improve code compliance effectiveness and help meet the expected level of performance.

Acceptance testing is not intended to take the place of commissioning or test and balance procedures that a building owner might incorporate into a building project. It is an adjunct process focusing only on demonstrating compliance with the Standards.

Third-party review of the information provided on Certificate of Acceptance documentation is not required, with one exception: duct leakage diagnostic test results for some constant volume space conditioning systems serving less than 5,000 square feet of conditioned floor area are required to be verified by a certified HERS Rater as specified in Standards Section 120.4(g).

7.3 Roles and Responsibilities

Individuals who perform the field testing and verification work, and provide the information required for completion of the Certificate of Acceptance documentation are not required to be licensed professionals. The person who signs the Certificate of Acceptance document to certify compliance with the acceptance requirements shall be licensed as specified in Standards Section 10-103(a)4.

It is the responsibility of the designer to specify products that meet these requirements. It is the responsibility of the installer to comply with all the mandatory requirements, even if the plans mistakenly do not. Code enforcement officials, in turn, must check that the mandatory features and specified devices are installed.

Residential

(k) Residential Lighting.

1. Light Source Requirements

A. All installed luminaires and lamps shall meet the requirements in Joint Appendix JA8 . All installed products shall be marked with one of the following JA8-2016, JA8-2016-E, JA8-2019, JA8-2019-E, JA8-2022, JA8-2022-E, or JA8-2025, JA8-2025-E.

EXCEPTION 1 to Section 150.0(k)1A: Integrated device lighting. Lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, and garage door openers.

EXCEPTION 2 to Section 150.0(k)1A: Navigation lighting such as night lights, step lights, and path lights less than 5 watts.

EXCEPTION 3 to Section 150.0(k)1A: Cabinet Lighting. Lighting internal to drawers, cabinetry, and linen closets with an efficacy of 45 lumens per watt or greater.

EXCEPTION 4 to Section 150.0(k)1A: The following luminaires:

1. LED light sources installed outdoors.

2. Inseparable Solid State Lighting (SSL) luminaires containing colored light sources that are installed to provide decorative lighting.

3. Pin-based linear fluorescent or compact fluorescent light sources using electronic ballasts.

4. High intensity discharge (HID) light sources including pulse start metal halide and high pressure sodium light sources.

5. Luminaires with hardwired high frequency generator and induction lamp.

6. Ceiling fan light kits that are subject to federal appliance regulations.

B. **Recessed Downlight Luminaires in Ceilings.** Luminaires recessed into ceilings shall meet all the following requirements:

i. Shall not contain screw base lamp sockets; and

ii. Have a label that certifies the luminaire is airtight rated with air leakage less than 2.0 cfm at 75 Pascals when tested in accordance with ASTM E283. An exhaust fan housing with integral light shall not be required to be certified airtight; and

iii. Be sealed with a gasket or caulk between the luminaire housing and ceiling, and have all air leak paths between conditioned and unconditioned spaces sealed with a gasket or caulk, or be installed per manufacturer's instructions to maintain airtightness between the luminaire housing and ceiling; and

iv. Meet the clearance and installation requirements of California Electrical Code Section 410.116 Installation in Fire-Resistant Construction for recessed luminaires.

EXCEPTION to Section 150.0(k)1Cii and iii: Recessed luminaires marked for use in fire-rated installations and recessed luminaires installed in non-insulated ceilings.

C. **Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources in enclosed or recessed luminaires shall be compliant with the JA8 elevated temperature requirements, including marking requirements .

D. **Blank Electrical Boxes**. The number of electrical boxes that are more than 5 feet above the finished floor and do not contain a luminaire or other device shall be no greater than the number of bedrooms. These electrical boxes must be served by a dimmer, vacancy sensor control, low voltage wiring or fan speed control.

2. **Indoor Lighting Controls.**

A. Lighting shall have readily accessible wall-mounted controls that allow the lighting to be manually turned ON and OFF.

EXCEPTION to Section 150.0(k)2A: Ceiling fans may provide control of integrated lighting via a remote control.

B. Lighting controls shall comply with the applicable requirements of Section 110.9 "Mandatory Requirements for Lighting Controls".

C. An Energy Management Control System (EMCS), multiscene programmable control, or any other control device may be used to comply with dimming, occupancy, and lighting control requirements in Section 150.0(k)2 if it provides the functionality of the specified controls in accordance with Section 110.9 "Mandatory Requirements for Lighting Controls", and the physical controls specified in 150.0(k)2A.

D. **Automatic Off Controls.**

i. In bathrooms, garages, laundry rooms, utility rooms, and walk-in closets, at least one installed luminaire shall be controlled by an occupancy or vacancy sensor providing automatic-off functionality.

ii. For lighting internal to drawers and cabinetry with opaque fronts or doors, controls that turn light off when the drawer or door is closed shall be provided.

E. **Dimming Controls**.

i. Lighting in habitable spaces shall have readily accessible wall-mounted dimming controls that allow the lighting to be manually adjusted up and down.

ii. Forward phase cut dimmers controlling LED light sources in these spaces shall comply with National Electrical Manufacturers Association Phase Cut Dimming for Solid State Lighting: Basic Compatibility (NEMA SSL 7A).

EXCEPTION 1 to Section 150.0(k)2F: Ceiling fans may provide control of integrated lighting via a remote control.

EXCEPTION 2 to Section 150.0(k)2F: Luminaires connected to a circuit with controlled lighting power less than 20 watts or controlled by an occupancy or vacancy sensor providing automatic-off functionality.

EXCEPTION 3 to Section 150.0(k)2F: Navigation lighting such as night lights, step lights, and path lights less than 5 watts, and lighting internal to drawers and cabinetry with opaque fronts or doors or with automatic off controls.

F. **Independent controls.** Lighting integrated into exhaust fans shall be controlled independently from the fans. The following shall be controlled separately from ceiling-installed lighting such that one can be turned on without turning on the other:

i. Undercabinet lighting

ii. Undershelf lighting

iii. Interior lighting of display cabinets

iv. Switched outlets

3. **Residential Outdoor Lighting.** In addition to meeting the requirements of Section 150.0(k)1A, luminaires providing residential outdoor lighting shall meet the following requirements, as applicable:

A. For single-family residential buildings, outdoor lighting permanently mounted to a residential building or to other buildings on the same lot shall meet the following requirements:

i. Controlled by a manual ON and OFF control switch that permits the automatic actions of item ii; and

ii. Controlled by one of the following controls:

A. Photocell and a motion sensor; OR

B. Photocell and an automatic time switch control; OR

C. Astronomical time clock control.

B. Controls that override to ON shall not be allowed unless the override automatically returns the automatic control to its normal operation within 6 hours.

C. An energy management control system that provides the specified lighting control functionality and complies with all requirements applicable to the specified controls may be used to meet these requirements.

4. **Internally illuminated address signs.** Internally illuminated address signs shall either:

A. Comply with Section 140.8 "Prescriptive Requirements for Signs"; or

B. Consume no more than 5 watts of power.

5. **Residential Garages for Eight or More Vehicles.** Lighting for residential parking garages for eight or more vehicles shall comply with the applicable requirements for nonresidential garages in Sections 110.9 "Mandatory Requirements for Lighting Controls", 130.0 "Lighting Systems and Equipment, and Electrical Power Distribution Systems—General", 130.1 "Mandatory Indoor Lighting Controls", 130.4 "Lighting Control Acceptance and Installation Certificate Requirements", 140.6 "Prescriptive Requirements for Indoor Lighting" And 141.0 "Additions, Alterations, and Repairs To Existing Nonresidential, and Hotel/Motel Buildings, To Existing Outdoor Lighting, and To Internally And Externally Illuminated Signs.

Multifamily Buildings

TABLE 180.2-E Control Requirements for Indoor Lighting System Alterations for Common Use Areas

Control Specifications	Projects complying with Section 180.2(b)4Biva	Projects complying with Sections 180.2(b)4Bivb or 180.2(b)4Bivc
Manual Area Controls 160.5(b)4Ai	Required	Required
Manual Area Controls 160.5(b)4Aii	Required	Required
Manual Area Controls 160.5(b)4Aii	Only required for new or completely replaced circuits	Only required for new or completely replaced circuits
Multi-Level Controls 160.5(b)4B	Required	Not Required
Automatic Shut Off Controls 160.5(c)4Ci	Required; 160.5(b)4Cid only required for new or completely replaced circuits	Required; 160.5(b)4Cid only required for new or completely replaced circuits
Automatic Shut Off Controls 160.5(c)4Cii	Required	Required
Automatic Shut Off Controls 160.5(c)4Ciii	Required	Required
Automatic Shut Off Controls 160.5(c)4Civ	Required	Required
Automatic Shut Off Controls 160.5(b)4Cv	Required	Required
Automatic Shut Off Controls 160.5(b)4Cvi	Required	Required ; except for 160.5(b)4Cvib
Automatic Shut Off Controls 160.5(b)4Cvii	Required	Required
Daylighting Controls 160.5(b)4D	Required	Not Required
Demand Responsive Controls 110.12(a) and 110.12(c)	Required	Not Required

Appendix 3: Energy Code Measure Ideas

This appendix documents ideas generated during this effort that extends beyond simplification and clarification. They are for consideration in the 2025 and 2028 Title 24 codes and standards enhancement process by the California Energy Commission, the Statewide CASE Team, and the California Energy Alliance.

Multilevel Lighting Controls

Consider the inclusion of 'continuous dimming' only to align with the most cost-effective LED technology capabilities. This would align with the use of LED sources as the basis for LPD allowances.

Consider the removal of the classroom exception to align with current market practices and the use of continuous dimming LED products.

Lighting Wattage Exclusions

Consider the inclusion of off grid lighting, including outdoor technologies and indoor DC lighting technologies that connect directly to a PV/battery source.

Controlled Environment Horticulture

Consider the use of "daily light integral" to replace the multilevel lighting controls language to better align with plant needs and best practices for horticulture lighting.

Outdoor Lighting

Consider reduction of lumen threshold to 3,500 initial lumens or less for luminaire shielding requirements to align with industry offerings and efficacy.

Add minimum performance requirements for outdoor motion sensors (i.e., coverage pattern, sensitivity, signal latency) to Section 110.9(b)6 and/or AT procedure.

Sign Lighting

Consider the inclusion of illuminance related requirements referencing guidance provided in *Night-time Brightness Level Recommendations for On-Premise Electronic Message Centers*. The recommendation from industry and lighting designers is 0.3 footcandles above ambient light level measured at distances defined by the Digital Billboard Recommendations Report by Lighting Sciences, Inc. published in 2008. This recommendation is directly related to digital/electronic signs.

Consider the reduction of lighting power allowances to align with LED technology capabilities. One manufacturer that was interviewed for this effort provided calculations showing a typical power density of three watts per square foot. Further research and industry outreach is necessary to understand market-wide product trends.

Consider the inclusion of message duration on a voluntary basis by local jurisdictions to align with safety recommendations for typical driving speeds. Industry interview responses agreed that typical message duration is eight seconds based on Federal Highway Administration (FHWA), California Department of Transportation (Caltrans), and other Department of Transportation agencies in the U.S. for off-premises digital billboards. This is further supported by recent Behavioral Traffic Safety Messaging on Variable Message Signs research conducted by Behavioral Traffic Safety Cooperative Research Program which focused on signage located above roadways. Further research and industry outreach is necessary to understand market-wide product trends and determine if message duration is an appropriate metric to be considered for inclusion in the voluntary chapter of Title 24, Part 11 (CALGreen) whose purpose is to improve public health, safety, and general welfare through enhanced design.

Nonresidential Lighting Devices

Consider the inclusion of quality specification, similar to the residential JA8, for nonresidential LED light sources (i.e., linear LED lamps, LED retrofit kits, LED luminaires) via Title 20 or Title 24. This would support the ban on linear fluorescents planned effective January 1, 2025[15].

Lighting Power Allowances

Consider adding an exception for alterations and retrofits to Section 130.0(c)1A Luminaire Classification and Power to address relamping of existing fixtures similar to ASHRAE 90.1 committee.

EXCEPTION to Section 130.0(c)1A: *For alterations and retrofits, maximum rated wattage or relamping rated wattage of a luminaire shall be listed on permanent, preprinted, field-installed label supplied by the luminaire manufacturer.*

Residential Lighting

Consider the inclusion of shielding requirements for outdoor residential lighting, similar to the BUG requirements for nonresidential outdoor lighting. This would address the contribution of residential outdoor lighting on light pollution in California.[16]

[15] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB2208

[16] https://www.latimes.com/science/story/2022-09-26/newsom-vetoes-bill-aimed-at-preventing-light-pollution

Appendix 4: Initiative Guidelines

Mission & Goal

The California Lighting Technology Center, in collaboration with Southern California Edison, RMS Energy Consulting LLC, and the California Energy Alliance, have set up this committee of stakeholders with the mission to develop recommendations that will ***simplify & clarify*** the nonresidential lighting and lighting controls language contained in the 2022 Title 24, Part 6 Building Energy Efficiency Standards.

The goal is to ***improve code comprehension & compliance*** in nonresidential lighting projects in California.

Recommendations will be provided to California Energy Commission staff for review and potential inclusion in 2025 Title 24, Part 6 updates by March 31, 2023.

Membership Requirements

Stakeholders were invited to take part in the committee and subcommittees via direct invite and/or via a publicly available invitation on the CLTC website:

https://cltc.ucdavis.edu/project/energy-code-lighting-language-cleanup-initiative

Active subcommittee topics and membership lists are available here:

https://docs.google.com/spreadsheets/d/1noGId9bXu0ZLgHRe3McMztmf0NnS66_R/edit#gid=71220915

Subcommittee membership enrollment is active and can be joined at any time.

Subcommittee Roles & Responsibilities

Subcommittees are comprised of committee staff, subcommittee chairs/co-chairs, and subcommittee members. Responsibilities of each role are provided in this section.

Committee Staff

- Committee staff assigned to each subcommittee may be a representative from the California Lighting Technology Center, California Energy Alliance, or RMS Energy Consulting LLC
- Assigned committee staff will perform administrative duties for subcommittee meetings, including note taking, scheduling, and agenda/assignment development in collaboration with subcommittee chair

Subcommittee Chairs/Co-Chairs

Subcommittee chairs/co-chairs will:

- Guide the subcommittee in activities that further the mission and goals of the initiative

- In collaboration with committee staff assigned to subcommittee, develop agenda and assignments for subcommittee meetings
- Make recommendations to assigned committee staff about systemic changes that would improve the overall effectiveness of subcommittee

Subcommittee Members

Subcommittee members will:

- Review all relevant material before subcommittee meetings, including applicable sections of 2022 Title 24, Part 6 and committee overview and guidelines
- Name any issues they have understanding or following the 2022 Title 24, Part 6 language as written
- Attend 1-2 subcommittee meetings per month and voice opinions on issues
- Support the efforts of the subcommittee chair and conduct individual assignments made by the chair
- Work as part of the team to ensure that the subcommittee's work and recommendations are in keeping with the general mission and goals of the initiative

Deliverables & Schedule

Due to subcommittee chairs/co-chairs by February 2023:

- Participation in subcommittee meetings & discussion

Based on subcommittee input, the subcommittee chairs and committee staff will compile all recommendations into the final deliverables that will be given to the Energy Commission for consideration in the 2025 Title 24 code cycle.

Due to Energy Commission by March 2023:

- Redline of 2022 Energy Code Lighting Sections
- Recommended 2025 Energy Code - Lighting Sections Language
- Recommended Edits & Improvements List

Kickoff Meeting Agenda Draft

- Introductions
- Overview of subcommittee chair nomination process
    - Zoom poll write in (self nominations encouraged!), email, or committee staff nominations by second scheduled meeting
    - Nominated individual(s) will be contacted to ensure role & responsibilities can be fulfilled on a voluntary basis before announcing chair appointments
    - If needed, an anonymous voting will take place via Survey Monkey tool will be provided to each subcommittee to be completed by second scheduled meeting

- Brainstorm potential focus areas applicable to subcommittee topic
    - Zoom Poll Prompt: In your opinion, what existing Title 24 lighting language causes the most confusion and/or non-compliance?
    - Zoom Poll Prompt: If you could choose one action, what do you think would have the largest impact to simplify the existing Title 24 lighting language?
    - Review 2022 Title 24 language applicable to subcommittee topic
    - Introduce Google Doc tool for comments/tracked edits
- Next steps
    - Discuss schedule
    - Discuss meeting frequency required to meet schedule
    - Homework
        - Nominate subcommittee chair/co-chairs via email to committee staff
        - Review 2022 language via Google document tool and add redlines or comments to document in tracked changes

Appendix 5: Stakeholder Feedback

Slides in this Appendix were presented during the February 2023 and May 2023 CASE Stakeholder workshops. Polls were conducted during the workshops to gather input from stakeholders; poll results are included with the slides below.

In addition to stakeholder feedback during the public workshops, discussions were held with five lighting designers who currently use Tailored Method to gather specific feedback on the Allowances Simplification proposal. These lighting designers were contacted through outreach to the California Illuminating Engineering Society (IES) and International Association of Lighting Designers (IALD) chapters.

Input from Lighting Designers on the concept of removing the Tailored Method and adding specialty lighting system allowances to Area Category Method:

- Tailored Method is used for projects that need to accommodate layered lighting systems for specialty lighting such as museum exhibit spaces.
- Lighting designers may use Tailored Method, it is unlikely architects, engineers or contractors will (they will use Area Category or Complete Building Methods).
- Tailored is time-consuming and requires expertise. Is the time spent to use Tailored Method worth it? May want to look at this.
- The simplified Tailored Method makes sense without lux, however, Tailored requires too many layers of documentation, such as RCR calculations per room.
- It is challenging to apply the Mounting Height factor because you have to design the lighting first and then apply the factor to the designed lighting. It would be simpler to just have an allowance based on Mounting Height like what is being proposed.
- Support for mounting height and ceiling height delineations in the proposal because those can be found on floor plans.
- Tall/ skinny spaces are when Room Cavity Ratio is needed, to accommodate a higher general lighting allowance- such as in lobbies. Providing an additional general lighting allowance may work.
- It is easy to get room dimensions for Room Cavity Ratio when using 3D design software.
- Do not want to see a reduction in wattage allowance. Feel there has been allowance reductions in past code cycles that are really limiting lighting designs that provide ambiance.
- Does allowance calculations using Area Category Method first and if that does not comply, tries Tailored Method next.
- Lighting designers use spreadsheets to apply allowance calculations to designs, but Electrical Engineer does the compliance form.

- Was not familiar with using performance path for lighting designs that are anomaly or specialty that would not comply prescriptively.
- Interested in more LPD allowance for Exhibit Museum, Option 2 provides that because IECC exempts museum exhibit lighting.
- Feels Option 1 would be the easiest way for designers to understand and apply.

TITLE 24, PART 6 | 2025 CODE CYCLE

Lighting Language Cleanup

Initiative Overview & Recommendations

Nonresidential, Single Family, and Multifamily Lighting

Nicole Hathaway, California Lighting Technology Center
Josh Dean, California Energy Alliance
Sally Blair, NORESCO

February 24, 2023

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

Mentimeter

Instructions

Go to

www.menti.com

Enter the code

Or use QR code

11

Introductions

Mentimeter

Nicole Hathaway
Communications Director
California Lighting Technology Center

Josh Dean
Executive Director
California Energy Alliance

Sally Blair
Director, Building Programs
NORESCO

Agenda

Background & Introductions	*5 min*
Proposed Cleanup & Code Change Ideas	*45 min*

Cleanup Ideas

- Overall Structure
- Multilevel Lighting Control
- Control Interactions
- Electrical Power Distribution
- Residential

Cleanup & Code Change Idea

- Tailored Method

Discussion & Next Steps	*15 min*

Mentimeter

Background

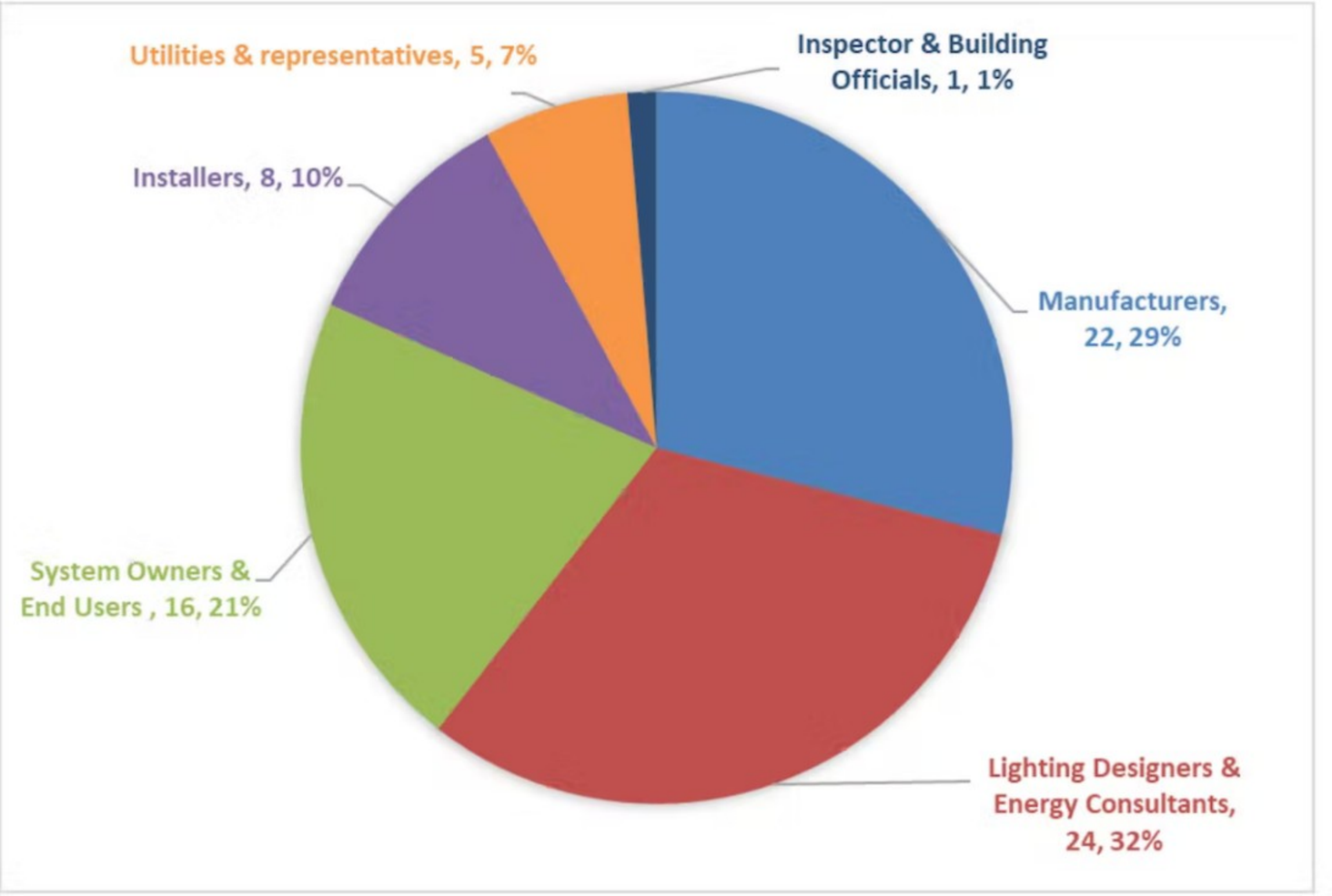
- Goals & Objectives
- Public Participation
- Targeted Topics

Goals & Objectives

- Establish a working group of industry stakeholders to develop recommendations that simplify & clarify the nonresidential & residential lighting language contained in the 2022 Energy Code
- Improve code comprehension & compliance among contractors, code officials, building owners and others involved in lighting projects in California

Public Participation

- 76 individuals representing 6 key stakeholder groups were invited to participate Q1 2022
- Public call to participate on the CLTC website
- Graph shows breakdown by stakeholder group, number of individuals invited, and percent of total invited.
- 40 participants are actively participating (53%)



Targeted Topics

Topic	Stakeholder Participants	Engagement (Out of 40 Participants)
Automatic Daylighting Controls	10	29%
Demand Responsive Controls	10	29%
Multilevel Lighting Controls	9	26%
Outdoor Lighting	9	26%
Control Interactions	8	24%
Shut-OFF Controls	7	21%
Lighting Power Allowances	7	21%
Controlled Environment Horticulture Lighting	7	21%
Overall Structure of the Energy Code	6	18%
Residential	6	18%
Manual Area Controls	5	15%
Multifamily Buildings	5	15%
Sign Lighting	5	15%
Power Adjustment Factors	3	9%
Lighting Wattage Exclusions	3	9%
Acceptance Testing Requirements	3	9%
Electrical Power Distribution	3	9%
Compliance Manual	2	6%
Lighting Definitions	2	6%

Review of Code Language Markup

- Cleanup Ideas
  - Overall Structure
  - Multilevel Lighting Control
  - Control Interactions
  - Electrical Power Distribution
  - Residential
- Code Change Idea
  - Tailored Method

Overall Structure of the Energy Code

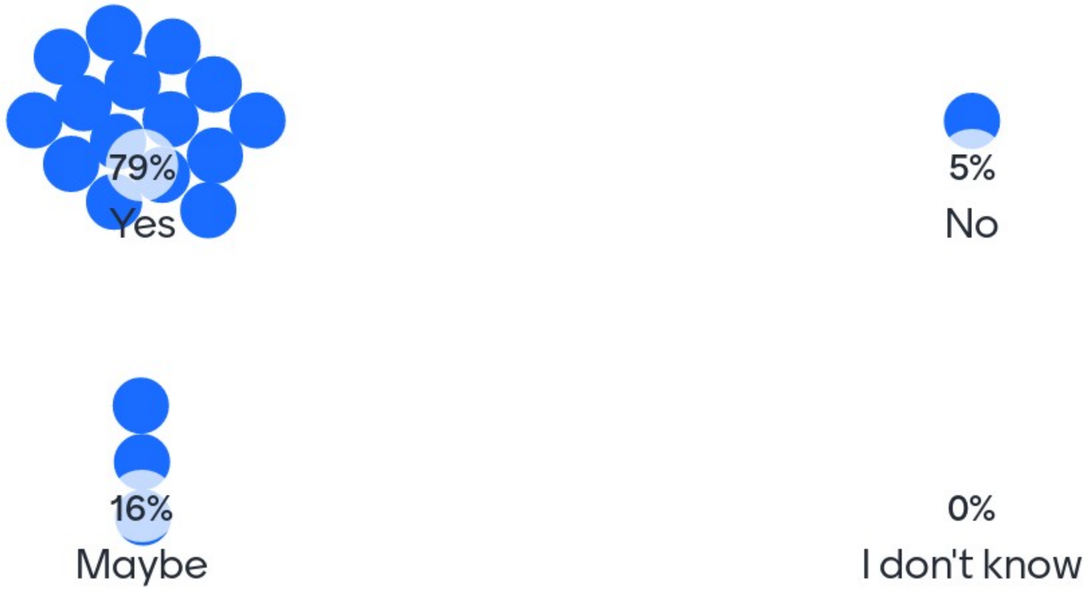
- Add modern digital features to Energy Code in compliance with ADA requirements
  - Expand bookmarks & add hyperlinks
  - Flowchart/decision tree function
  - Collect comments & suggested edits
- Update subsection naming conventions
  - Ex. 170.2(c)4Niv → 170.2(c)4.N.iv
- Align terminology with ASHRAE 90.1 and IECC
- Reorganize tables to appear after first reference instead of end of section
- Italicize defined terms

Mentimeter

Poll questions coming up!

Would new features in an online version and the addition of more features help you navigate the energy code better than you do now?

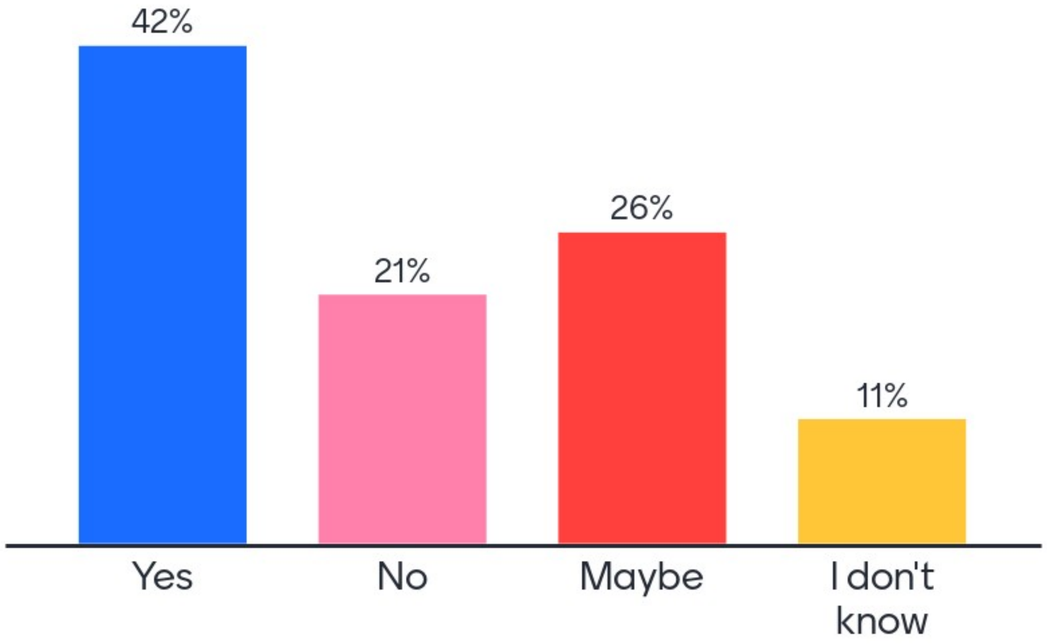
Mentimeter



19

Would naming conventions for subsections help you better navigate the energy code? Example: "Section 170.2(c)4Niv" would be "Section 170.2(c)4.N.iv"?

Mentimeter



19

Multilevel Lighting Controls

Mentimeter

- Simplify Table 130.1-A by:
  - **Option 1: Deleting it and moving continuous dimming language to main paragraph.**
  - Option 2: Removing duplicate/outdated light source types & uniformity column
- Simplify uniformity requirements
- Remove classroom exception

Since 2019, our LPD allowances have been based on LED technology which is now commonly offered with continuous dimming.

Multilevel Lighting Controls Language Cleanup: OPTION 1

Mentimeter

Simplify Table 130.1-A by **deleting it** and moving continuous dimming language to main paragraph.

The general lighting of any enclosed spacearea 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot shall provide multilevel lighting controls that:

1. aAllow the level of lighting to be adjusted up and down.

2. Do not reduce the uniformity of illuminance. The multilevel controls shall:

3. 1. Provide continuous dimming from 10-100 percent power. the number of control steps specified in TABLE 130.1-A.; and

EXCEPTION 1 to Section 130.1(b)1: Classrooms with a connected general lighting load of 0.6 watts per square feet or less shall have a minimum of one control step between 30-70 percent of full rated power, regardless of luminaire type.

2. Meet the uniformity requirements specified in TABLE 130.1-A.

EXCEPTION 1 to Section 130.1(b): An enclosed space area enclosed by ceiling height partitions that has only one luminaire with no more than two lamps or has only one inseparable SSL luminaire.
EXCEPTION 2 to Section 130.1(b): Restrooms.
EXCEPTION 3 to Section 130.1(b): Healthcare facilities.

Multilevel Lighting Controls Language Cleanup: OPTION 2

Mentimeter

Simplify Table 130.1-A by **removing duplicate/ outdated light source types and uniformity column**.

The general lighting of any enclosed spacearea 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot shall provide multilevel lighting controls that allow the level of lighting to be adjusted up and down. Uniformity of illuminance shall not be reduced by multilevel lighting controls. The multilevel controls shall:

1. Pprovide the number of control steps specified in TABLE 130.1-A.; and

EXCEPTION 1 to Section 130.1(b)1: Classrooms with a connected general lighting load of 0.6 watts per square feet or less shall have a minimum of one control step between 30-70 percent of full rated power, regardless of luminaire type.

2. Meet the uniformity requirements specified in TABLE 130.1-A.

EXCEPTION 1 to Section 130.1(b): An enclosed space area enclosed by ceiling height partitions that has only one luminaire with no more than two lamps or has only one inseparable SSL luminaire.

EXCEPTION 2 to Section 130.1(b): Restrooms.

EXCEPTION 3 to Section 130.1(b): Healthcare facilities.

Multilevel Lighting Controls: OPTION 2

TABLE 130.1-A MULTILEVEL LIGHTING CONTROLS ~~AND UNIFORMITY~~ REQUIREMENTS

Luminaire ~~Type~~	Minimum Required Control Level~~Steps~~ (percent of full rated power[1])	~~Uniform level of illuminance shall be achieved by:~~
LED luminaires ~~and LED light source systems~~	Continuous dimming, 10-100 percent	~~Continuous dimming 10-100 percent~~
~~Line-voltage sockets except GU-24~~	~~Continuous dimming 10-100 percent~~	~~Continuous dimming 10-100 percent~~
~~Low-voltage incandescent systems~~	~~Continuous dimming 10-100 percent~~	~~Continuous dimming 10-100 percent~~
~~Fluorescent luminaires~~	~~Continuous dimming 20-100 percent~~	~~Continuous dimming 20-100 percent~~
~~GU-24 sockets rated for fluorescent ≤ 20 watts;~~ ~~Pin-based compact fluorescent ≤ 20 watts[2]~~ ~~Linear fluorescent and U-bent fluorescent ≤ 13 watts~~	~~Minimum one step between 30-70 percent~~	~~Continuous dimming; or~~ ~~Stepped dimming; or~~ ~~Switching alternate lamps in a luminaire.~~
~~Track Lighting~~	~~Minimum one step between 30-70 percent~~	~~Continuous dimming; or~~ ~~Stepped dimming; or~~ ~~Separately switching circuits in multi-circuit track with a minimum of two circuits.~~
Luminaire with four or more ~~L~~linear fluorescent~~/ and~~ U-bent fluorescent lamps > 13 watts	Minimum one step in each range: 20 - 40 percent 50 - 70 percent 75 - 85 percent 100 percent	~~Stepped dimming; or~~ ~~Continuous dimming; or~~ ~~Switching alternate lamps in each luminaire, having a minimum of 4 lamps per luminaire illuminating the same area and in the same manner~~
All ~~O~~other ~~light sources, including HID and Induction~~	Continuous dimming, 10-100 percent OR Minimum one step between 3~~5~~0 - 70 percent	~~Stepped dimming; or~~ ~~Continuous dimming; or~~ ~~Switching alternate lamps in each luminaire, having a minimum of 2 lamps per luminaire, illuminating the same area and in the same manner.~~

1. Full rated input power of driver, ballast and lamp, corresponding to maximum ballast factor
~~2. Includes only pin based lamps: twin tube, multiple twin tube, and spiral lamps~~

Multilevel Lighting Controls: OPTION 2

Mentimeter

TABLE 130.1-A MULTILEVEL LIGHTING CONTROLS REQUIREMENTS

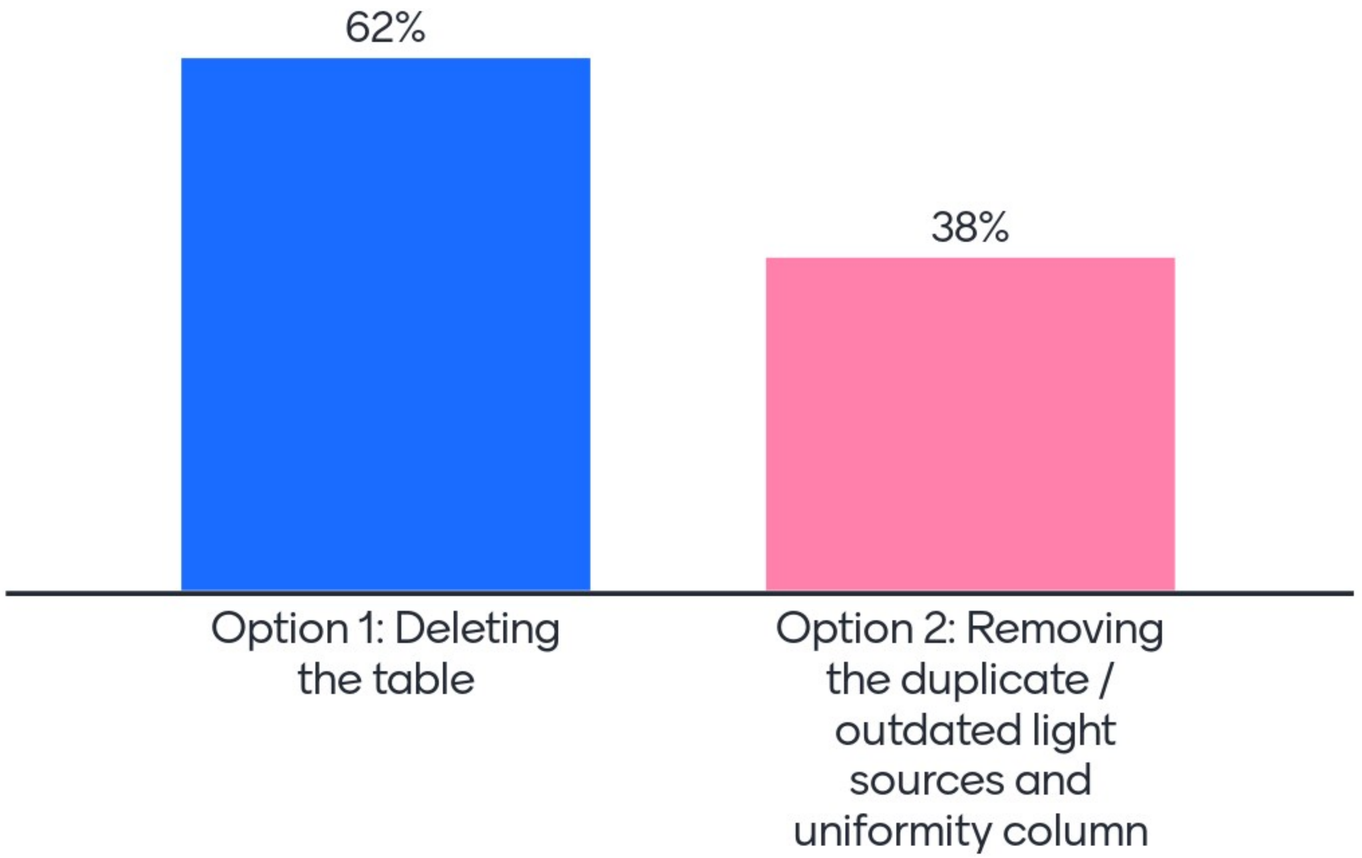
Luminaire	Minimum Required Control Level (percent of full rated power[1])
LED luminaire	Continuous dimming, 10-100 percent
Luminaire with four or more linear fluorescent/U-bent fluorescent lamps > 13 watts	Minimum one step in each range: 20 - 40 percent 50 - 70 percent 75 - 85 percent 100 percent
All other	Continuous dimming, 10-100 percent OR Minimum one step between 30 - 70 percent

1. Full rated input power of driver, ballast and lamp, corresponding to maximum ballast factor

Poll question coming up!

Which do you prefer?

Mentimeter



Control Interactions

Mentimeter

The Controls Interactions subcommittee recommends **deleting Section 130.1(f)** as we believe the guidance duplicates information in Section 130.1(a) through (e) and Section 110.9.

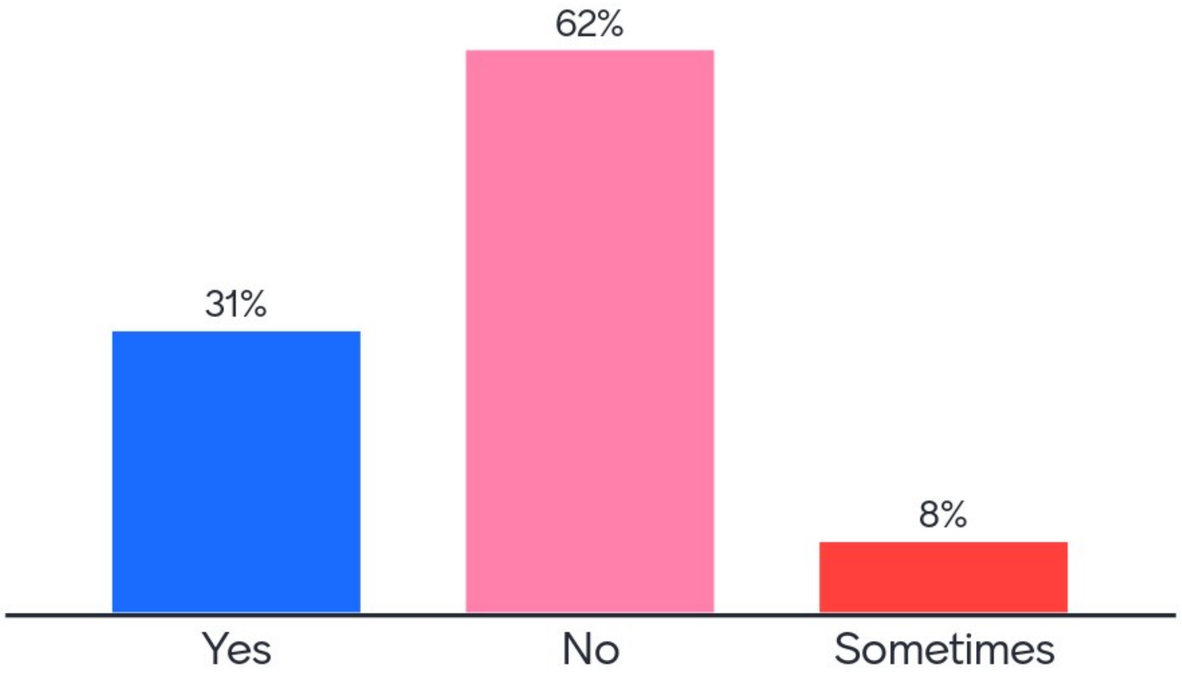
Backup recommendation:

- Add referenced Section names and numbers
- Add overview table to summarize written recommendations

POLL QUESTION NEXT SLIDE

Do you utilize the guidance provided in the Controls Interactions section (section 130.1(f))?

Mentimeter



13

Electrical Power Distribution

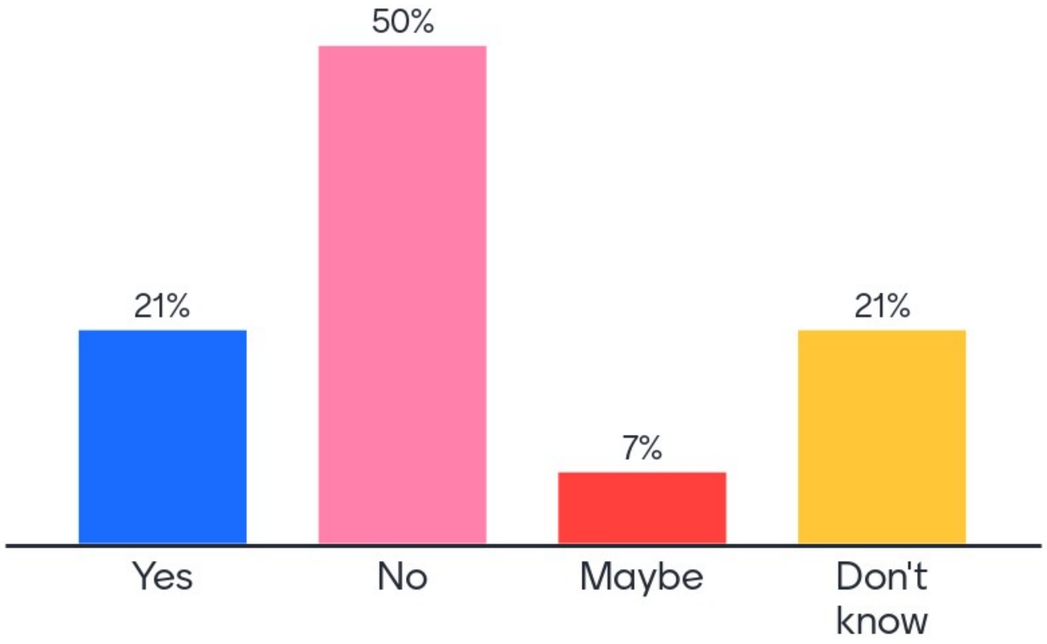
Mentimeter

- Hotel guest room time delay language for controlled receptacles in Section 130.5(d)4
  - Currently 30 minute time delay
- Hotel guest room time delay language for lighting in Section 130.1(c)8
  - Currently 20 minute time delay

Would reducing the time delay for controlled receptacles from 30 minutes to 20 minutes in Hotel Guest rooms impact your ability to meet the Energy Code with the technology you typically specify?

Would reducing the time delay for controlled receptacles from 30 to 20 minutes in hotel guest rooms impact your ability to meet energy code?

Mentimeter



14

Residential

- Table 150.0-A currently defines ‘high luminous efficacy light sources’ by identifying which light sources are “automatically” vs. must meet JA8 requirements
- Subcommittee feels this adds unnecessary complexity and does not follow the pattern of the rest of the Energy Code requirements
- **Proposed clean up:**
  - Delete Table 150.0-A and refer directly to JA8 in Section 150.0(k)1A.
  - Add items in left column of Table 150.0-A as new Exception 4.

Mentimeter

POLL QUESTION COMING UP!

1. Light Source ~~Luminaire~~ Requirements

A. ~~**Luminaire Efficacy.**~~ All installed luminaires and lamps shall meet the requirements in Joint Appendix JA8~~TABLE 150.0-A~~.

EXCEPTION 1 to Section 150.0(k)1A: Integrated device lighting. Lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, ceiling fan kits that are subject to federal appliance regulations, and garage door openers.

EXCEPTION 2 to Section 150.0(k)1A: Navigation lighting such as night lights, step lights, and path lights less than 5 watts.

EXCEPTION 3 to Section 150.0(k)1A: Cabinet Lighting. Lighting internal to drawers, cabinetry, and linen closets with an efficacy of 45 lumens per watt or greater.

EXCEPTION 4 to Section 150.0(k)1A: The following luminaires:

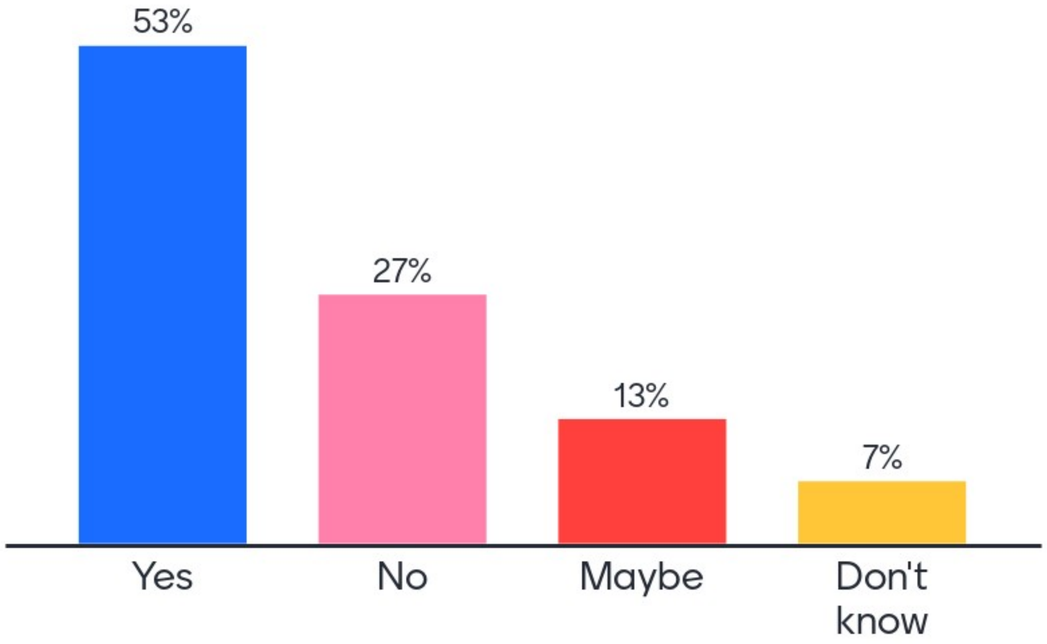
1. LED light sources installed outdoors.
2. Inseparable Solid State Lighting (SSL) luminaires containing colored light sources that are installed to provide decorative lighting.
3. Pin-based linear fluorescent or compact fluorescent light sources using electronic ballasts.
4. High intensity discharge (HID) light sources including pulse start metal halide and high pressure sodium light sources.
5. Luminaires with hardwired high frequency generator and induction lamp.

TABLE 150.0-A CLASSIFICATION OF HIGH LUMINOUS EFFICACY LIGHT SOURCES

Light sources in this column other that those installed in ceiling recessed downlight luminaires are classified as high luminous efficacy and are **not** required to comply with Reference Joint Appendix JA8.	Light sources in this column are required to comply with Reference Joint Appendix JA8 and shall be certified and marked as required by JA8.
1. LED light sources installed outdoors. 2. Inseparable Solid State Lighting (SSL) luminaires containing colored light sources that are installed to provide decorative lighting. 3. Pin-based linear fluorescent or compact fluorescent light sources using electronic ballasts. 4. High intensity discharge (HID) light sources including pulse start metal halide and high pressure sodium light sources. 5. Luminaires with hardwired high frequency generator and induction lamp. 6. Ceiling Fan Light Kits subject to federal appliance regulations.	7. All light sources installed in ceiling recessed downlight luminaires. Note that ceiling recessed downlight luminaires shall not have screw base sockets regardless of lamp type as specified in Section 150.0(k)1C. 8. Any light source not otherwise listed in this table.

Would being pointed to JA8 requirements directly instead of via Table 150.0-A make the energy code easier to understand?

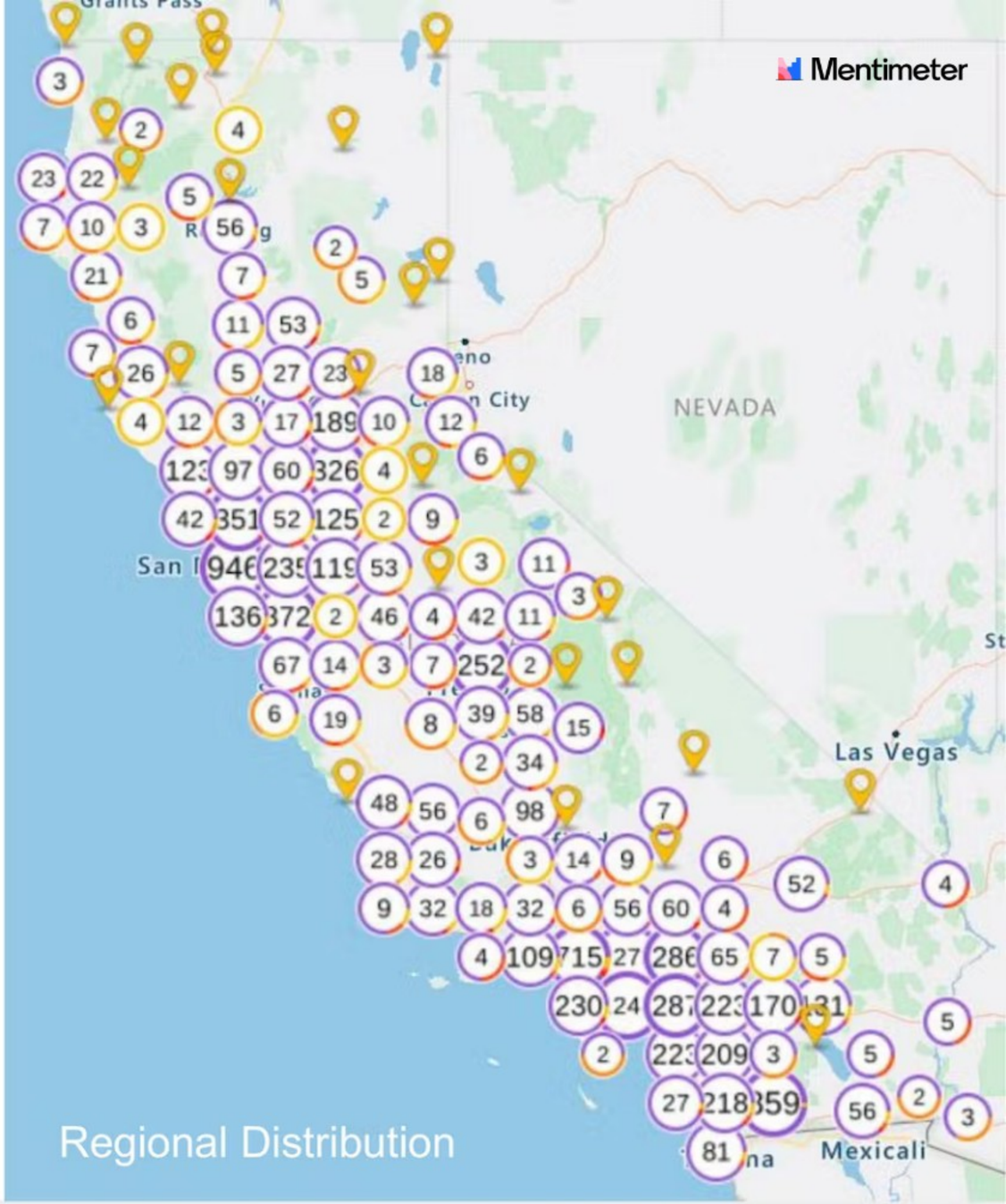
Mentimeter



15

Simplify Based on Compliance Data

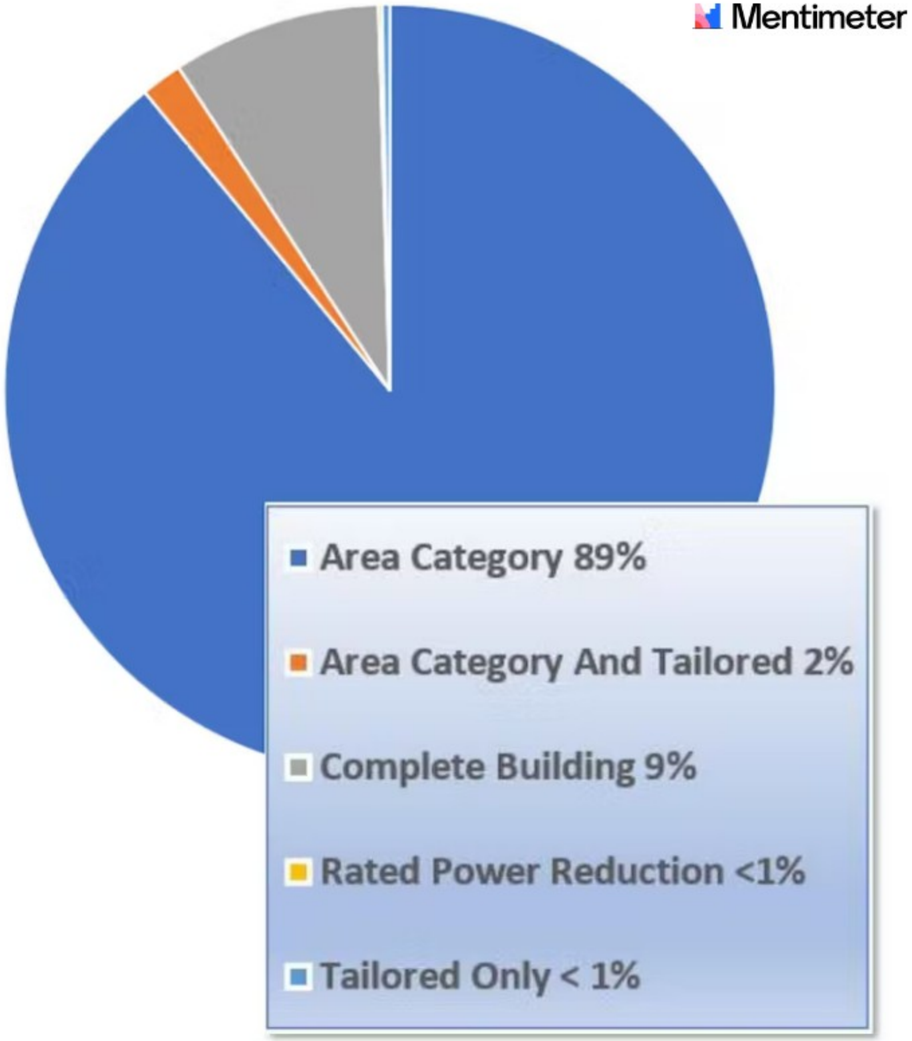
- Looked at how real projects are complying
- Dataset includes 12,520 indoor lighting scopes
- Projects are from all over the State
- New construction & alterations



Data Showed….

- 98% of projects use Area Category or Complete Building
- Of projects using Tailored, only a few space types are utilized

Space Function	Tailored	Area Category	Complete Building
Retail Merchandise Sales	409 (19%)	1517 (72%)	180 (9%)
Dining Area	62 (6%)	850 (80%)	152 (14%)
Multipurpose Area	18 (0.5%)	3025 (99.5%)	-
Exhibit Museum Area	12 (21%)	45 (79%)	-
Main Entry Lobby	7 (0.2%)	2798 (99.8%)	-
Conference Area	4	See Multipurpose	-
Showroom Area	3	-	-
Religious Worship Area	2	58	4
Grocery Store Area	2	272	6
Meeting Center Area	1	See Multipurpose	-
Auditorium Area	1	34	-



Simplification Proposal

Objective:

Remove Tailored Method and provide Additional Allowances under Area Category Method ***without decreasing or increasing wattage allowances***.

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

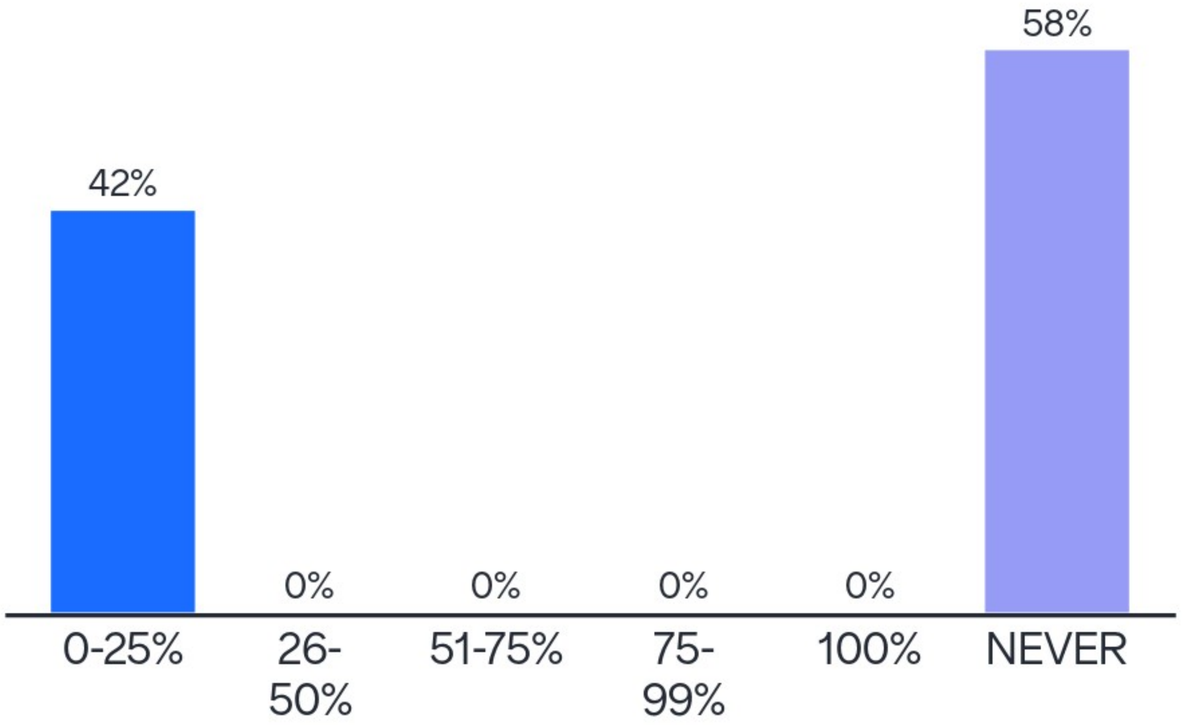
Primary Function Area		Allowed LPD for General Lighting (W/ft²)	Additional Lighting Power	
			Qualified Lighting Systems[1]	Additional Allowance (W/ft², unless noted otherwise)
Convention, Conference, Multipurpose & Meeting Area		0.75	Decorative/Display	0.25
Dining Area	Bar/Lounge and Fine Dining ceiling height <= X'	0.45	Decorative/Display Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14'	0.35 X W/ft X W/ft X W/ft 0.XX 0.XX 0.XX
	Bar/Lounge and Fine Dining ceiling height > X'	0.XX		
	Cafeteria/ Fast Food	0.45	Decorative/Display	0.25
	Family & Leisure	0.40	Decorative/Display	0.25
Museum Area	Exhibition/Display ceiling height <= X'	0.60	Decorative/Display Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14'	0.45 X W/ft X W/ft X W/ft 0.XX 0.XX 0.XX
	Exhibition/Display ceiling height > X'	0.XX		
	Restoration Room	0.70	Detailed Task Work	0.35
Lobby, Main Entry	ceiling height <= X'	0.70	Decorative/Display Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14'	0.25 X W/ft X W/ft X W/ft
	ceiling height > X'	0.XX		
Retail Sales Area	Grocery Sales	1.00	Decorative/Display	0.35
	Retail Merchandise Sales	0.95	Decorative/Display Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' Valuable Display Case	0.35 X W/ft X W/ft X W/ft 0.XX 0.XX 0.XX 0.XX
	Fitting Room	0.60	External Illuminated Mirror	40 W/ea
			Internal Illuminated Mirror	120 W/ea

[1] "MH" is the Mounting Height which is the height in feet above finished floor and bottom of the luminaire

~~3. **Tailored method.** Requirements for using the Tailored Method include the following:~~

Indicate how often you use Tailored Method for compliance:

Mentimeter



Would you support the concept to remove Tailored Method and add new Area Category Additional Allowances for Retail, Museum, etc.?

Mentimeter

15

Would you support the concept discussed to remove Tailored Method and add new Area Category Additional Allowances for these category of spaces?

Mentimeter

Discussion and Next Steps

We want to hear from you!

Mentimeter

- POLL QUESTION NEXT SLIDE:
  - Provide **any last comments or feedback** on this presentation now, verbally or add to GoTo Questions Pane

Please provide comments on this measure by March 10, 2023. Please send comments to info@title24stakeholders.com and copy CASE Authors (see contact info on following slide).

- More information on pre-rulemaking for the 2025 Energy Code at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency

We want to hear from you! Please provide any last comments or questions.

Mentimeter

Thank You

Nicole Hathaway
California Lighting Technology Center
Title 24 Stakeholder
530-747-3847
nehathaway@ucdavis.edu

Josh Dean
California Energy Alliance
Title 24 Stakeholder
619-786-0979
josh.dean@caenergyalliance.org

Sally Blair
NORESCO
Title 24 Stakeholder
303-459-7420
SBlair@noresco.com

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

TITLE 24, PART 6 | 2025 CODE CYCLE

Lighting Language Cleanup

Simplification of Allowance Calculation Methods
Nonresidential and Multifamily Indoor Lighting

Sally Blair, NORESCO

May 16, 2023

Utility Sponsored Stakeholder Meeting – Round 2

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

Agenda

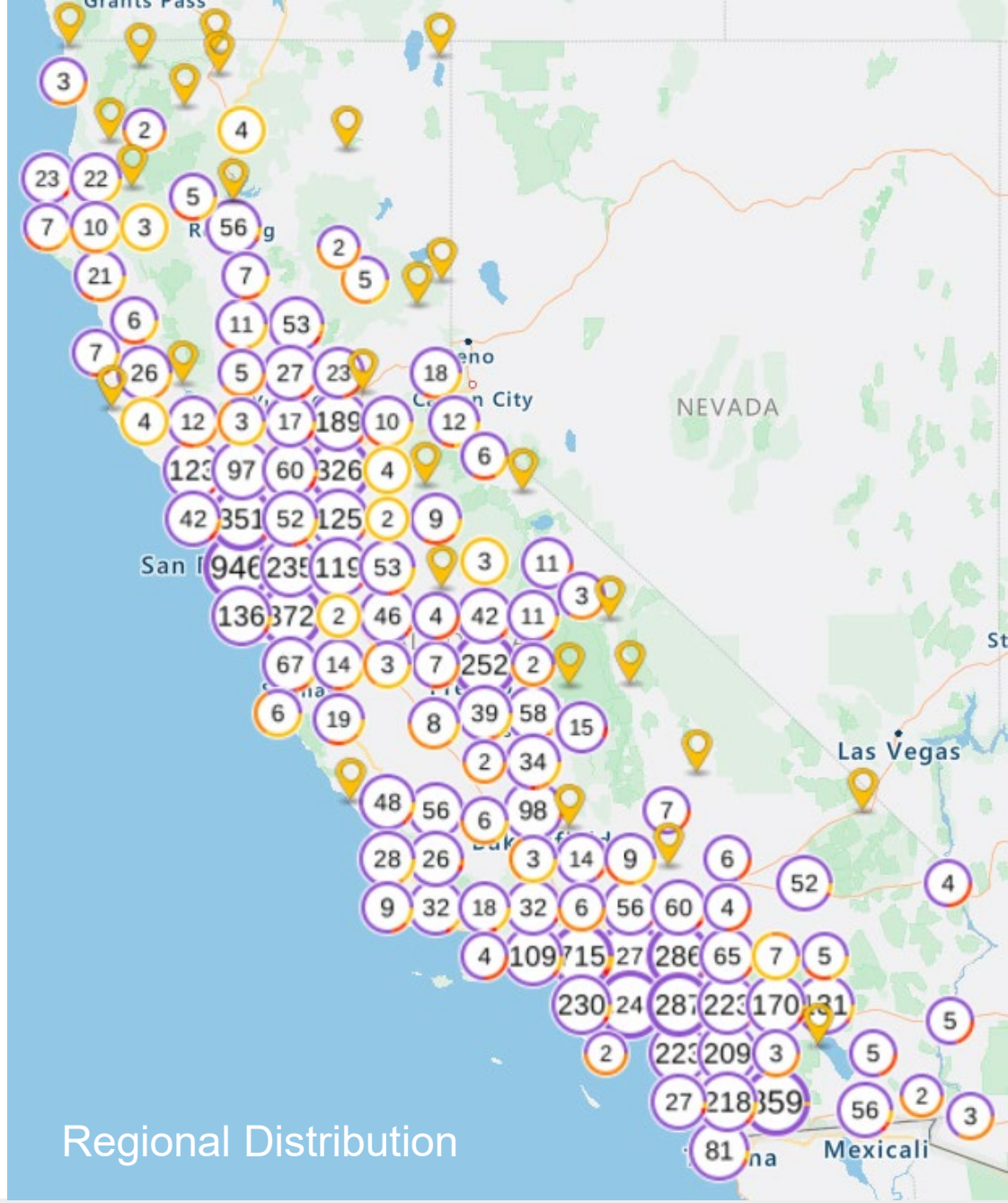
Overview of Code Change Proposal

Stakeholder Feedback
- Necessary Space Functions
- Options Being Considered

Next Steps

Simplify Based on Compliance Data

- Looked at how real projects are complying
- Dataset includes 12,520 indoor lighting projects
- Projects are from all over the State
- New construction & alterations

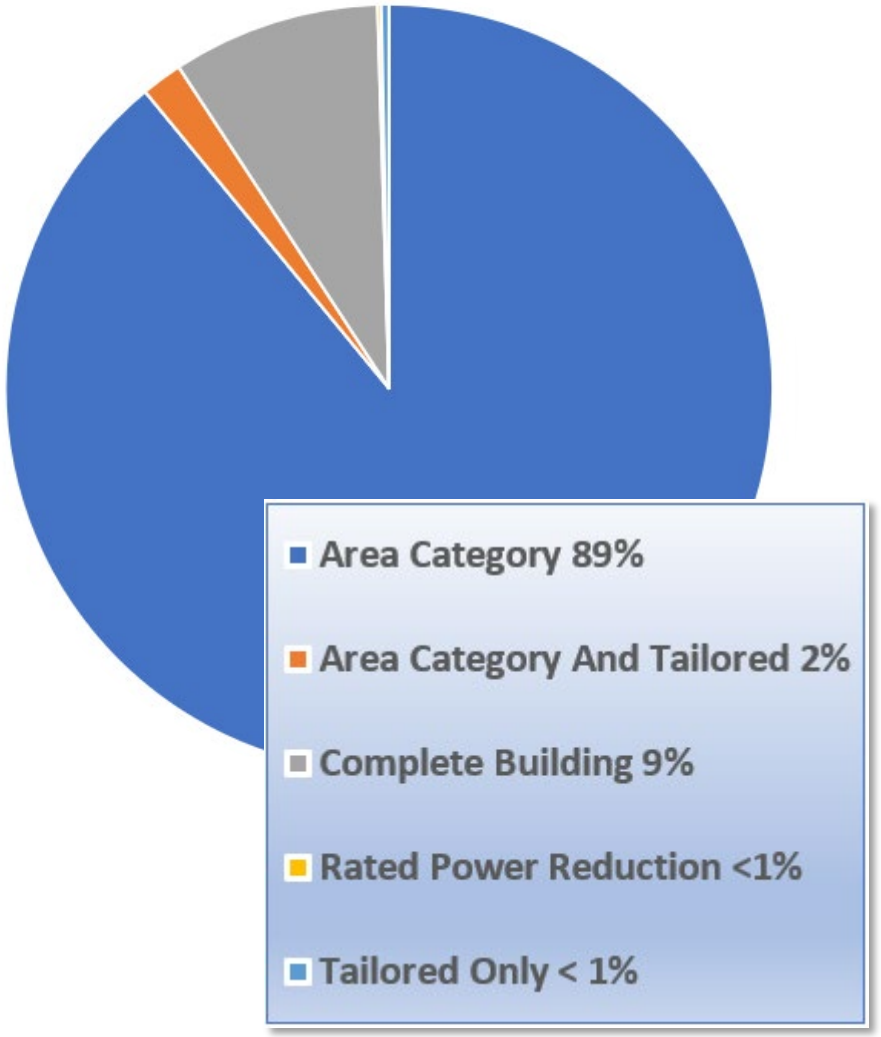


** Data collected through Virtual Compliance Assistant and EnergyPro under the 2019 Standards*

Data Showed….

- 98% of projects use Area Category or Complete Building
- Of projects using Tailored, only a few space types are utilized

Space Function	Tailored	Area Category	Complete Building
Retail Merchandise Sales	409 (19%)	1517 (72%)	180 (9%)
Dining Area	62 (6%)	850 (80%)	152 (14%)
Multipurpose Area	18 (0.5%)	3025 (99.5%)	-
Exhibit Museum Area	12 (21%)	45 (79%)	-
Main Entry Lobby	7 (0.2%)	2798 (99.8%)	-
Conference Area	4	See Multipurpose	-
Showroom Area	3	-	-
Religious Worship Area	2	58	4
Grocery Store Area	2	272	6
Meeting Center Area	1	See Multipurpose	-
Auditorium Area	1	34	-



Proposed Code Change

OPTION 1:

- Eliminate Tailored Method, include additional wall/floor/task and display case allowances under Area Category for some function areas

OPTION 2:

- Eliminate Tailored Method, bring the IECC allowances into Area Category for some function areas

OPTION 3:

- Simplify Tailored requirements and code language including Table 140.6-D

Option 1: Remove Tailored & Add Specialty Allowances to Area Category Method

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

Primary Function Area		Allowed Lighting Power Density for General Lighting (W/ft²)	Additional Lighting Power	
			Qualified Lighting Systems	Additional Allowance (W/ft², unless noted otherwise)
Convention, Conference, Multipurpose and Meeting Area		0.75	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14'	0.25 2 W/ft 2.35 W/ft 2.66 W/ft 0.30 0.35 0.40
Retail Sales Area	Grocery Sales	1.00	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' General Lighting Ceiling Height > 10'	0.35 6.60 W/ft 7.76 W/ft 8.80 W/ft 0.60 0.70 0.80 0.10
	Retail Merchandise Sales	0.95	Decorative~~/Display~~ Wall Display MH <= 10'6" Wall Display MH 10'7"- 14' Wall Display MH > 14' Floor & Task MH <= 10'6" Floor & Task MH 10'7"- 14' Floor & Task MH > 14' Valuable Display Case General Lighting Ceiling Height > 10'	0.35 9.5 W/ft 11.2 W/ft 12.7 W/ft 0.45 0.52 0.60 0.50 0.10

Option 2: Remove Tailored & Add IECC Allowances to Area Category Method

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

Primary Function Area	Allowed Lighting Power Density for General Lighting (W/ft²)	Qualifying Lighting	Additional Allowance (W/ft²), unless noted otherwise)
Auditorium Area	~~0.7~~ 0.57	Decorative/Display	~~0.45~~ 0.55
Convention, Conference, Multipurpose, and Meeting Center Areas	~~0.75~~ 0.88	Decorative/Display	~~0.25~~ 0.55
Bar Lounge & Fine Dining Areas	~~0.45~~ 0.76	Decorative/Display	~~0.35~~ 0.55
Exhibit, Museum Areas	~~0.60~~ 0.55	Decorative/Display	~~0.45~~ 0.70
Hotel Function Area	~~0.85~~ 0.88	Decorative/Display	~~0.25~~ 0.55
Lobby, Main Entry	~~0.7~~ 0.80	Decorative/Display	~~0.25~~ 0.66
Religious Worship Area	~~0.95~~ 0.75	Decorative/Display	~~0.25~~ 0.55
Retail Sales Area			
~~Grocery~~	~~1.00~~	~~Decorative/Display~~	~~0.35~~
Retail Merchandise Sales and Grocery	~~0.95~~ 0.85	Decorative~~/Display~~ Initial Watts per Bldg Sales Display Retail 1 Sales Display Retail 2 Sales Display Retail 3 Sales Display Retail 4	~~0.35~~ 0.55 750 W 0.40 0.40 0.70 1.00
Motion picture Theatre	~~0.5~~ 0.27	Decorative/Display	~~0.25~~ 0.55
Performance Arts Theatre	~~0.8~~ 1.09	Decorative/Display	~~0.25~~ 0.55

Option 3: Simplify Tailored Requirements in S140.6

TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES

Primary Function Area (specified RCR*)	~~General Illumination Level (Lux)~~ Allowed LPD for General Lighting (W/sf)	Additional Lighting Power	
		Qualified Lighting Systems	Additional Allowance
Bar/ Lounge and Fine Dining Areas	~~200~~	Wall display lighting (W/ft)	1.25
RCR < 2.0	0.4	Floor Display, Task & Decorative (W/sf)	~~(0.45 + 0.35)~~ 0.80
2.0 < RCR <=3.5	0.5		
3.5 < RCR <=7.0	0.65		
7.0 < RCR	0.85		
Main Entry Lobby	~~200~~	Wall Display lighting (W/ft)	3.40
RCR < 2.0	0.4	Floor Display, Task & Decorative (W/sf)	~~(0.20 + 0.35)~~ 0.55
2.0 < RCR <=3.5	0.5		
3.5 < RCR <=7.0	0.65		
7.0 < RCR	0.85		
Retail Merchandise Sales	~~500~~	Wall Display Lighting (W/ft)	11.5
RCR < 2.0	0.80	Floor Display, Task & Decorative (W/sf)	~~(0.70 + 0.35)~~ 1.05
2.0 < RCR <=3.5	0.90		
3.5 < RCR <=7.0	1.25	Valuable Display Case (W/sf-floor)	0.50
7.0 < RCR	1.55		

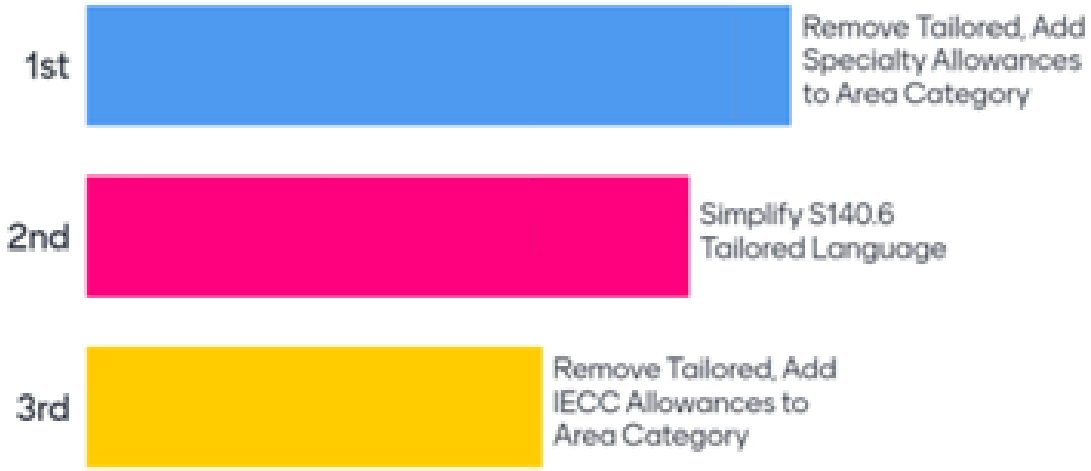
*RCR is the room cavity ratio of the enclosed space containing the primary function area and is calculated according to Section 140.6(c)3.F.i.

Poll

- **Measure Name:** Lighting Clean-up: Allowance Calculation Simplification
- **Type of Poll:** Ranking
- **Question:** Please rank the three options we just talked about in order of most desirable (1) to least desirable (3).
- **Answers:** Option 1: Remove Tailored, Add Specialty Allowances to Area Category, Option 2: Remove Tailored, Add IECC Allowances to Area Category, Option 3: Simplify S140.6 Tailored Language

Poll Results

Please rank the three options we just talked about in order of most desirable (1) to least desirable (3).



22 Participants

Poll

How Ranking Poll Results are Calculated

- Results are based on a points system called “borda count”
  - 1st place ranking gets 3 points
  - 2nd place ranking gets 2 points
  - 3rd place ranking gets 1 point

Options	1st place votes	2nd place votes	3rd place votes	Points	
Option 1: Remove Tailored, Add Specialty Allowances to AC Method	11	5	5	48	< 1st place overall
Option 2: Remove Tailored, Add IECC Allowances to AC Method	4	6	9	33	< 3rd place overall
Option 3: Simplify Tailored in S140.6	7	8	5	42	< 2nd place overall
Total “Votes” for each rank	**22**	**19**	**19**		

Thank You

Sally Blair
NORESCO
SBlair@noresco.com

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM