What’s New in Title 24, Part 6 2016 and Title 20?

Lighting Updates

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PG&E
We offer FREE:

- Ace Tools™
- Ace Training™
- Ace Resources™

A variety of tools to help you identify the forms, installation techniques, and standards relevant to building projects in California.

Classroom and online trainings on Title 24, Part 6. Additional 2013 classes coming soon!

Fact Sheets, Trigger Sheets and Checklists to help you understand when Title 24, Part 6 is “triggered” and how to correctly comply when it is.
Why do we have CA Standards?

- Section 25402 of the Public Resources Code (known as the **Warren Alquist Act**)
- The act created the Energy Commission in 1974 and gave it authority to develop and maintain Building Energy Efficiency Standards
- Requires the Standards and new requirements to be cost effective over the economic life of the structure
- Requires the Energy Commission to update the Standards periodically (about every 3 years)
What's New in Lighting in Title 24, Part 6 2016 and Title 20?
Intent behind the 2016 code

2008: California Energy Action Plan adopted
   – Efficiency 1st choice in meeting future energy needs

Zero Net Energy Goals
   – 2020 Net Zero “New” Residential Homes
   – 2030 Net Zero “New” Nonresidential buildings
### Key State Policy Goals

<table>
<thead>
<tr>
<th>Focus Area</th>
<th>Goal</th>
<th>Now</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Buildings</td>
<td>New Construction ZNE¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing Homes (reduction relative existing stock)¹</td>
<td>40%</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Commercial Buildings</td>
<td>New Construction ZNE¹</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Existing ZNE¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Buildings</td>
<td>New Construction &amp; Major Retrofit ZNE²</td>
<td>50%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing ZNE (by square footage)²</td>
<td></td>
<td></td>
<td></td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>SB 350</td>
<td>Increase energy efficiency in existing buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50%</td>
</tr>
<tr>
<td>Existing Buildings</td>
<td>New and enhanced codes &amp; standards, code simplification, increased compliance, asset ratings, purchase agreements, etc.³</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>GHG Emissions</td>
<td>Statewide GHG Emissions (all sources)⁴</td>
<td>1990 Levels</td>
<td>40% Below 1990</td>
<td>80% Below 1990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Efficiency</td>
<td>25 percent reduction in urban water use⁵</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. California’s *Long Term Energy Efficiency Strategic Plan.*
2. Executive Order B-18-12
3. Assembly Bill 758; Existing Buildings Action Plan
4. Assembly Bill 32 for 2020; Executive Order B-30-15 for 2030 and 2050
5. Executive Order B-29-15

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**Supporting Agencies**
What’s New in the 2016 Code?

MAJOR CHANGES

REDUCTION TO LIGHTING POWER DENSITY VALUES
Lighting power density allotments have been reduced for many indoor and outdoor spaces including spaces in auditoriums, libraries, and schools. Reductions affect building, area and tailored methods of compliance.

UPDATED POWER ADJUSTMENT FACTORS
The 2016 Standards contain two new power adjustment factors (PAF) that address institutional tuning and daylight harvesting. Three other PAF have been eliminated.

MULTILEVEL LIGHTING & OCCUPANCY CONTROLS
Multilevel lighting control requirements have been simplified. In addition, spaces that utilize certain types of occupancy controls are no longer required to also include multilevel control. Other occupancy control requirements are now to apply in practice.

ALTERATIONS
The line between maintenance and retrofit has been redrawn. More projects are now exempt from alteration requirements. Those that are required to comply now have more options including some with reduced control requirements.
CALIFORNIA’S 2016 — NONRESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

CALIFORNIA ENERGY COMMISSION

The state’s energy efficiency standards for new buildings and appliances have saved consumers billions in reduced electricity and natural gas bills. The building standards include better windows, insulation, lighting, air conditioning systems and other features that reduce energy consumption in homes and businesses. Since 1978 these standards have helped protect the environment by reducing more than 250 million metric tons of greenhouse gas emissions (or the equivalent of removing 37 million cars off California roads).

5% More Stringent

DOOR AND WINDOW INTERLOCKS

Sensors on doors and windows adjust the thermostat to turn off the heating or cooling if a door or window is left open for more than five minutes. This allows occupants to take advantage of outside temperatures and save on heating and cooling costs.

DIRECT DIGITAL CONTROLS

For larger heating, ventilation and air conditioning systems, installing digital controls enables communication with building energy management systems, allowing managers to tailor the building’s heating and cooling demands and prevent waste.

ELEVATORS

Efficient ventilation fans and lighting sources installed within the elevator, along with controls that turn off the cab lighting and fans when the elevator is empty, save energy both when the elevator is in use and when empty.

OUTDOOR LIGHTING

The general power allowance for outdoor lighting has been lowered to include newer, more efficient luminaires which are widely available and commonly used for outdoor lighting applications.

ESCALATORS

Requires escalators and moving walkways in transit areas to run at a lower, less energy-consuming speed when not in use.

These are cost effective measures that builders may consider to achieve new levels of efficiency. They can be traded for other efficient technologies such as higher efficiency HVAC units, higher efficiency water heaters, etc.
When does Title 24, Part 6 2016 go into effect?
### Mandatory Indoor Controls

<table>
<thead>
<tr>
<th>Section</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>§130.1(a)</td>
<td>Area Controls</td>
</tr>
<tr>
<td>§130.1(b)</td>
<td>Multi-Level Lighting Control</td>
</tr>
<tr>
<td>§130.1(c)</td>
<td>Shut-OFF Control</td>
</tr>
<tr>
<td>§130.1(d)</td>
<td>Automatic Daylighting Control</td>
</tr>
<tr>
<td>§130.1(e)</td>
<td>Demand Responsive Control</td>
</tr>
</tbody>
</table>
On/off switch does not need to be accessible to public in:
• Public restrooms with more than 2 stalls, parking areas, stairwells and corridors
Mandatory Controls §130.1

- If dimming is required, pair with a dimmer (+ on/off)
  - Public restrooms and areas required to utilize full or partial-OFF occupancy sensors are now exempt

**Multi Level Controls 130.1(b)**

**Source + Luminaire + Controls**

Image: CLTC, UC Davis
Stairwells can be controlled per building (not per floor as required in 2013)

0.10 w/ft² exempt for egress lighting

ALL building types

IF an office < 250ft², multipurpose room < 1,000 ft², classroom or conference room trigger multilevel control, then;

• partial-on OR vacancy sensor is required

• If the space does NOT trigger a multi-level control, then occupancy sensor is allowed
Mandatory Controls §130.1

Auto Daylighting 130.1(d)
Auto daylighting has minor changes on how illuminance levels are measured in parking garages.

Demand Response 130.1(e)
Non-habitable spaces no longer exempt from the 10,000 ft² trigger (spaces less than 0.5 w/sf still excluded).

Acceptance testing not required for alteration projects where controls added to control 20 or less luminaires for entire project.

NRCA-LTI-02-A
NRCA-LTI-03-A
NRCA-LTI-04-A
NRCA-LTI-05-A
NRCA-LTO-02-A
## Mandatory Outdoor Lighting Controls and Equipment

<table>
<thead>
<tr>
<th>Section</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>§130.2(a)</td>
<td>Incandescent Lighting (no change)</td>
</tr>
<tr>
<td>§130.2(b)</td>
<td>Cutoff Requirements (no change)</td>
</tr>
<tr>
<td>§130.2(c)</td>
<td>Controls (new requirements)</td>
</tr>
</tbody>
</table>
Controls for Outdoor Lighting §130.2(c)

All outdoor luminaires (§130.2(c)1):
• Controlled by photocontrol and time-switch, or
• Astronomical time-switch control

Outdoor lighting mounted ≤ 24 feet above the ground (§130.2(c)3):
• Motion sensor that automatically reduces lighting power by 40 - 90% (new)
• Outdoor sales lots and sales canopies (new)
• Exceptions:
  – poles with max of 75W
  – non-poles with max 30 W
  – linear lighting with max of 4 W/ft
### Prescriptive Lighting Measures §140.6, §140.7

<table>
<thead>
<tr>
<th>Section</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>§140.6(a)</td>
<td>Power Adjustment Factors</td>
</tr>
<tr>
<td>§140.6(b), §140.6(c)</td>
<td>Lighting Power Allowance</td>
</tr>
<tr>
<td>§140.6(d)</td>
<td>Automatic Daylighting Controls in Secondary Daylit Zones</td>
</tr>
<tr>
<td>§140.7</td>
<td>Outdoor Lighting</td>
</tr>
</tbody>
</table>
Prescriptive Indoor Lighting Req. §140.6

New for 2016:

**Some LPD allowances reduced**
- Complete Building: 9 reductions
- Area Category:
  - 16 reductions, 2 removals

**New PAFs added for**
- Daylight dimming plus OFF
- Institutionalized Tuning

**PAFs removed**
- Partial-ON occupancy sensors
- Manual Dimming/Multiscene programmable control
- Combined manual dimming plus partial-ON occ. sensor
<table>
<thead>
<tr>
<th>PRIMARY FUNCTION AREA</th>
<th>2013 100%</th>
<th>2016 100%</th>
<th>2016 85%</th>
<th>PRIMARY FUNCTION AREA</th>
<th>2013 100%</th>
<th>2016 100%</th>
<th>2016 85%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditorium Area</td>
<td>1.5 ³</td>
<td>1.4 ³</td>
<td>1.19</td>
<td>Library Area</td>
<td>1.2 ³</td>
<td>1.1 ³</td>
<td>0.94</td>
</tr>
<tr>
<td>Auto Repair Area</td>
<td>0.9 ²</td>
<td>0.77</td>
<td></td>
<td>Reading areas</td>
<td>1.1 ³</td>
<td>0.95 ³</td>
<td>0.81</td>
</tr>
<tr>
<td>Beauty Salon Area</td>
<td>1.7</td>
<td>1.45</td>
<td></td>
<td>Stack areas</td>
<td>1.5 ³</td>
<td>0.95 ³</td>
<td>0.81</td>
</tr>
<tr>
<td>Civic Meeting Place Area</td>
<td>1.3 ³</td>
<td>1.11</td>
<td></td>
<td>Hotel lobby</td>
<td>1.5 ³</td>
<td>0.95 ³</td>
<td>0.81</td>
</tr>
<tr>
<td>Classroom, Lecture, Training, Vocational Areas</td>
<td>1.2 ⁵</td>
<td>1.02</td>
<td></td>
<td>Main entry lobby</td>
<td>0.8</td>
<td>0.7</td>
<td>0.60</td>
</tr>
<tr>
<td>Commercial and Industrial Storage Areas (conditioned and unconditioned)</td>
<td>0.6</td>
<td>0.51</td>
<td></td>
<td>Lounge Area</td>
<td>1.1 ³</td>
<td>0.90 ³</td>
<td>0.77</td>
</tr>
<tr>
<td>Commercial and Industrial Storage Areas (refrigerated)</td>
<td>0.7</td>
<td>0.60</td>
<td></td>
<td>Malls and Atria</td>
<td>1.2 ³</td>
<td>0.95 ³</td>
<td>0.81</td>
</tr>
<tr>
<td>Convention, Conference, Multipurpose and Meeting Center Areas</td>
<td>1.4 ³</td>
<td>1.2 ³</td>
<td>1.02</td>
<td>Medical and Clinical Care Area</td>
<td>1.2</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Corridor, Restroom, Stair, and Support Areas</td>
<td>1.1 ³</td>
<td>1.0 ³</td>
<td>0.85</td>
<td>Office Area</td>
<td>&gt; 250 square feet</td>
<td>0.75</td>
<td>0.64</td>
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<tr>
<td>Dining Area</td>
<td>0.7 ²</td>
<td>0.55 ²</td>
<td>0.47</td>
<td>Parking Area</td>
<td>0.3</td>
<td>N/A</td>
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<tr>
<td>Exercise Center, Gymnasium Areas</td>
<td>1.0</td>
<td>0.85</td>
<td></td>
<td>Dedicated Ramps</td>
<td>1.2</td>
<td>1.0</td>
<td>0.85</td>
</tr>
<tr>
<td>Exhibit, Museum Areas</td>
<td>2.0</td>
<td>1.8</td>
<td>1.5</td>
<td>Daylight Adaptation Zn 9</td>
<td>0.6</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Financial Transaction Area</td>
<td>1.2 ³</td>
<td>1.0 ³</td>
<td>0.85</td>
<td>Religious Worship Area</td>
<td>1.5 ³</td>
<td>1.28</td>
<td></td>
</tr>
<tr>
<td>General Commercial and Industrial Work Areas</td>
<td>Low bay</td>
<td>0.9 ²</td>
<td>0.77</td>
<td>Retail Merchandise Sales, Wholesale Showroom Areas</td>
<td>1.2 ⁶ and ⁷</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High bay</td>
<td>1.0 ²</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Precision</td>
<td>1.2 ⁴</td>
<td>1.02</td>
<td>Theater Area</td>
<td>Motion picture</td>
<td>0.9 ³</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Performance</td>
<td>1.4 ³</td>
<td>1.19</td>
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<tr>
<td>Grocery Sales Area</td>
<td>1.2 ⁶ and ⁷</td>
<td>1.02</td>
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<td>Transportation Function Area</td>
<td>Concourse &amp; Baggage</td>
<td>0.5</td>
<td>0.43</td>
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<tr>
<td>Hotel Function Area</td>
<td>1.5 ³</td>
<td>1.2 ³</td>
<td>1.19</td>
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<td>Ticketing</td>
<td>1.2</td>
<td>1.0</td>
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<td>Kitchen, Food Preparation Areas</td>
<td>1.6</td>
<td>1.2</td>
<td>1.02</td>
<td>Videoconferencing Studio</td>
<td>1.2 ⁸</td>
<td>1.02</td>
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<td>Laboratory Area, Scientific</td>
<td>1.4 ¹</td>
<td>1.19</td>
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<td>Waiting Area</td>
<td>1.1 ³</td>
<td>0.8 ³</td>
<td>0.68</td>
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<tr>
<td>Laundry Area</td>
<td>0.9</td>
<td>0.7</td>
<td>0.60</td>
<td>All other areas</td>
<td>0.6</td>
<td>0.5</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Footnote # Type of lighting system allowed

1. Specialized task work
   - Maximum allowed added lighting power: 0.2 W/ft²
2. Specialized task work
   - Maximum allowed added lighting power: 0.5 W/ft²
3. Ornamental lighting as defined in Section 100.1 and in accordance with Section 140.6.(c)2.
   - Maximum allowed added lighting power: 0.5 W/ft²
4. Precision commercial and industrial work
   - Maximum allowed added lighting power: 1.0 W/ft²
5. Per linear foot of white board or chalk board.
   - Maximum allowed added lighting power: 5.5 W per linear foot
6. Accent, display and feature lighting - luminaires shall be adjustable or directional
   - Maximum allowed added lighting power: 0.3 W/ft²
7. Decorative lighting - primary function shall be decorative and shall be in addition to general illumination
   - Maximum allowed added lighting power: 0.2 W/ft²
8. Additional Videoconferencing Studio lighting complying with all of the requirements in Section 140.6(c)2Gvii
   - Maximum allowed added lighting power: 1.5 W/ft²
9. Daylight Adaptation Zones shall be no longer than 66 feet from the entrance to the parking garage
   - Maximum allowed added lighting power: 200 watts for the 1st ATM location; 50 watts for each additional ATM location in a group
# 2016 Power Adjustment Factors

**AKA: Control Credits**

<table>
<thead>
<tr>
<th>TYPE OF CONTROL</th>
<th>TYPE OF AREA</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylight Dimming plus OFF Control</td>
<td>Luminaires in skylit daylit zone or primary sidelit daylit zone</td>
<td>0.10</td>
</tr>
<tr>
<td>Occupant Sensing Controls in Large Open Plan Offices</td>
<td>In open plan offices &gt;250 square feet: One sensor controlling an area that is: No larger than 125 square feet</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>From 126 to 250 square feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>From 251 to 500 square feet</td>
</tr>
<tr>
<td>Institutional Tuning</td>
<td>Luminaires in non-daylit areas: Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Luminaires in daylit areas: Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.</td>
<td>0.05</td>
</tr>
<tr>
<td>Demand Responsive Control</td>
<td>All building types less than 10,000 square feet. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF</td>
<td>0.05</td>
</tr>
</tbody>
</table>
# Indoor Lighting Alterations

## §141.0(b)2

<table>
<thead>
<tr>
<th>Section</th>
<th>Control</th>
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</thead>
<tbody>
<tr>
<td>§141.0(b)2I</td>
<td>Entire Luminaire Alteration</td>
</tr>
<tr>
<td>§141.0(b)2J</td>
<td>Luminaire Component Modification</td>
</tr>
<tr>
<td>§141.0(b)2K</td>
<td>Lighting Wiring Alteration</td>
</tr>
<tr>
<td>§141.0(b)2L</td>
<td>Outdoor Lighting Alteration</td>
</tr>
</tbody>
</table>
Is installing tubular LEDs that require the removal of the ballast (tube connects direct to line voltage) in 148 luminaires an alteration or a repair?
# Indoor Lighting Alterations

### §141.0(b)2I, J

<table>
<thead>
<tr>
<th>Applicable Section 130.1 control requirements</th>
<th>Resulting lighting power, compared to the lighting power allowance in Section 140.6(c)2, Area Category Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXISTING OPTION 1</strong></td>
<td></td>
</tr>
<tr>
<td>Lighting power density is</td>
<td></td>
</tr>
<tr>
<td>&gt; 85% of allowance</td>
<td></td>
</tr>
<tr>
<td><strong>EXISTING OPTION 2</strong></td>
<td></td>
</tr>
<tr>
<td>Lighting power density is</td>
<td></td>
</tr>
<tr>
<td>≤ 85% of allowance</td>
<td></td>
</tr>
<tr>
<td><strong>NEW OPTION</strong></td>
<td></td>
</tr>
<tr>
<td>Existing lighting power is reduced by</td>
<td></td>
</tr>
<tr>
<td>50/35%</td>
<td></td>
</tr>
</tbody>
</table>

| Section 130.1(a)1, 2, and 3 Area Controls     | Yes                                                                                                      |
| **EXISTING OPTION 2**                        | Yes                                                                                                      |
| New standard lighting power is reduced by      | Yes                                                                                                      |

| Section 130.1(b) Multi-Level Lighting Controls | Yes                                                                                                      |
| - only for alterations to general lighting of  | Two level lighting control for each altered luminaire, with at least one step between 30-70 percent of lighting power regardless of luminaire type, or meet Section 130.1(b) |
| enclosed spaces 100 square feet or larger with |                                                                                                           |
| a connected lighting load that exceeds 0.5     | Not Required                                                                                             |
| watts per square foot                          |                                                                                                           |

| Section 130.1(c) Shut-Off Controls            | Yes                                                                                                      |
| **EXISTING OPTION 2**                        | Yes                                                                                                      |
| New standard for lighting power is reduced by  | 'Yes                                                                                                     |

| Section 130.1(d) Automatic Daylight Controls   | Yes                                                                                                      |
| **EXISTING OPTION 2**                        | Not Required                                                                                             |
| New standard for lighting power is reduced by  | Not Required                                                                                             |

| Section 130.1(e) Demand Responsive Controls    | Yes                                                                                                      |
| - only for alterations where the area of all   | Not Required                                                                                             |
| altered enclosed spaces is greater than 10,000  | Not Required                                                                                             |
| square feet in a single building, where the alteration also changes the area of the space, the occupancy type of the space, or increases the lighting power |                                                                                                           |
Lighting Alterations §141.0(b)2 I, J, K

Entire Luminaire Alteration

- Removing and reinstalling luminaires ≥ 10% existing
- Replacing/adding luminaires (3 or more)
- Adding, removing, replacing walls along with redesign of lighting system (3 or more)

Luminaire Component Modification

- Replacing ballast/driver and lamps
- Changing the light source
- Changing the optical system
- ≥ 70 existing luminaires modified

Exception: Acceptance testing not required when controls are added to control 20 or fewer luminaires
Indoor Lighting Alterations §141.0(b)2I, J

Two options for meeting Alteration requirements:

1. Meet LPD & controls per TABLE 141.0-E
   - Area control
   - Multilevel lighting control
   - Shutoff control
   - Automatic daylight control
   - Demand responsive control

2. Reduce existing lighting power by
   - 50% in hotel, office and retail with manual area and shut-off controls
   - 35% in all other spaces with manual area and shut-off controls

Similar to 2013

New for 2013 & 2016!
<table>
<thead>
<tr>
<th></th>
<th>LPD</th>
<th>130.1(a)</th>
<th>130.1(a)</th>
<th>130.1(a)</th>
<th>130.1(a)</th>
<th>130.1(b)</th>
<th>dimming</th>
<th>130.1(c)</th>
<th>130.1(c)</th>
<th>auto-shut-off</th>
<th>auto-shut-off</th>
<th>countdown switches</th>
<th>holiday feature time clock</th>
<th>motion partial off</th>
<th>motion partial off</th>
<th>guestroom key card/occ sensor</th>
<th>motion partial off</th>
<th>motion partial off</th>
<th>auto daylighting controls - primary side exterior skylt</th>
<th>auto daylighting parking</th>
<th>demand response &gt; 10,000 sf</th>
</tr>
</thead>
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<td>Entire Luminaire 141.0(b)2ii &gt; 10%/space</td>
<td>&gt; 85%</td>
<td>Y</td>
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<td>Y</td>
<td>120 W</td>
<td>60 W</td>
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<tr>
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<td>Y</td>
<td>Y</td>
<td>NR</td>
<td>NR</td>
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<tr>
<td>Entire Luminaire 141.0(b)2iii: 50% less power than existing office, retail, hotel, 35% other</td>
<td>NA</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Component Modification, 141.0(b)2ii: &gt; 70 luminaires/project, &gt; 10%/space</td>
<td>&gt; 85%</td>
<td>Y</td>
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<td>Y</td>
<td>120 W</td>
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<td>NA</td>
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<td>Y</td>
<td>Y</td>
<td>&gt; 10 Luminaires</td>
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<td><strong>2013 Standard</strong></td>
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<td>NR</td>
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<td>Luminaire Alterations 141.0(b)2iii Increase wattage</td>
<td>&lt;100%</td>
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<td>Y</td>
</tr>
<tr>
<td>Luminaire Mod-in-place and 1 for 1 replacement 140.1(b)2iiii</td>
<td>&gt; 85%</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>60 W</td>
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<tr>
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<td>&lt; 85%</td>
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<td>NR</td>
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<tr>
<td>Wiring Alterations 140.1(b)2liv</td>
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<td>Y</td>
<td>Y</td>
<td>120 W</td>
<td>60 W</td>
<td>Y</td>
</tr>
</tbody>
</table>

Table: Jon McHugh
NR = not required
To use the new compliance pathway in a K-12 school, what % reduction must the new lighting system achieve over the existing?
Indoor Lighting Wiring Alterations §141.0(b)2K

Lighting Wiring Alterations

- New lighting circuit
- Replace, modify, or relocated wiring between switch or panelboard and luminaire
- Replace lighting control panels, panelboards, or branch circuit wiring

Applicable Lighting Wiring Alteration req. for the enclosed space:

- Area controls, shut-OFF controls
- Multilevel lighting controls: one control step between 30 – 70% or meet §130.1(b)
- Daylighting controls §130.1(d) (if ≥ 10 luminaires in the daylit zone)
Prescriptive Outdoor Lighting
Req. §140.7

New for 2016:

General Hardscape LPDs reduced

Lighting for ATMs, tunnels, and bridges is no longer exempt, included in power allowance calculations.
CALIFORNIA’S 2016 — RESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

The state’s energy efficiency standards for new buildings and appliances have saved consumers billions in reduced electricity and natural gas bills. The building standards include better windows, insulation, lighting, air conditioning systems and other features that reduce energy consumption in homes and businesses. Since 1978 these standards have helped protect the environment by reducing more than 250 million metric tons of greenhouse gas emissions (or the equivalent of removing 37 million cars off California roads).

$7,400 SAVINGS OVER A 30 YR. MORTGAGE
INITIAL COST $2,700

28% More Stringent

HIGH EFFICACY LIGHTING
All lighting in new homes must be efficient. Installation of high quality lighting with controls that nearly halve the energy required for lights in new homes.

HIGH PERFORMANCE ATTICS
Attics with additional insulation at the roof deck keep attic temperatures closer to ambient, improving the home’s heating and cooling performance. Extra insulation at the roof deck, in addition to the ceiling insulation, will reduce the attic temperature by 35 degrees or more during hot summer days.

HIGH PERFORMANCE WALLS
Increased wall insulation keeps the sun’s heat out of your home during hot summer months and warm air in during winter months, improving comfort and reducing energy consumption.

IMPROVED WATER HEATING SYSTEM EFFICIENCY
Installing tankless water heating technology and better distribution systems reduces the energy needed to provide hot water to the home by about 35 percent.

These are cost effective measures that home builders may consider to achieve new levels of efficiency. They can be traded for other efficient technologies such as higher efficiency HVAC units, higher efficiency water heaters, etc.
Could this luminaire be considered high-efficacy under the 2016 standards?
Residential Lighting

MAJOR CHANGES

ALL HIGH-EFFICACY LIGHTING
Indoor and outdoor lighting for new homes must be high efficacy.

JA-8 UPDATED
Joint Appendix JA8 regulations now contain requirements for more types of residential high-efficacy lamps and luminaires. In the 2013 code, JA-8 regulations only applied to LED sources.

SIMPLIFIED CONTROL REQUIREMENTS
Lighting control requirements for indoor spaces are now simpler. Control requirements are based, in nearly all cases, on the type of lamp or luminaire installed, not the space.
Residential “What’s New?” Fact Sheet

Mechanical Highlights

- **All ducts in conditioned spaces must include R-4.2 insulation.**
- **Duct leakage requirement has been reduced to 15% maximum for single family homes.**

Prescriptive Measures $150.1

- **High performance attic vents with ducts in attic (options A and B).**
- **R-6 duct insulation in Zones 5, 2, 4, (B-I).**
- **R-6 duct insulation in Zones 3, and (B-I).**
- **High performance attic vents with ducts in conditioned space (option C).**
- **R-6 in all zones.**
- **Whole house fan must supply 25% less air than produced by 2 cfm/ft.**
- **Attic vent area also reduced to 1.47” x 720” of airflow.**

Domestic Hot Water Highlights

**Increased Prescriptive Efficiency for Water Heaters (3 options) $150.1(c)**

1. Tankless (gas or propane) minimum energy factor of 0.82.
2. Tank ≤ 50 gal (gas or propane) minimum energy factor of 0.86. Additional HERS verification (HERS with Heat Transfer Water Heating Installation (HTW) and higher HERS verified compact hot water distribution system or HERS verified DHW pipe insulation required).
3. Tank ≥ 50 gal (gas or propane) minimum energy factor of 0.76. Additional HERS verification (HERS verified compact hot water distribution system or HERS verified DHW pipe insulation required).

**Optional Isolation Valves $150.2(a)(b)**

- **Instantaneous water heaters with an input rating of 0.88kW/UFt.**
- **Greater need for an isolation valve on cold water supply and hot water leaving water heater.**
- **Each valve needs a hose bib or other fitting allowing for flushing of the water heater when the valves are closed.**

**Optional Water Heater Pipe Insulation $150.2(b)(1)**

- **For water heater replacements, install piping insulation per mandatory measures at a total cost of at least $1.25.**

Onsite Renewable Systems Highlights

**The Performance Approach is used.**

- **The STD PBR in Climate Zones 15, 16, 17.**
- **The system is 2.1 WSC for Single Family.**
- **The system is 3.1 WSC for Multifamily.**
- **The amount of credits will depend upon the climate and the type of dwelling.**

**Lighting Highlights**

- **High efficiency lighting is essential to reducing energy and building costs, and the 2016 Standards require that lighting efficiency be adopted.**

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## High Efficacy Luminaires

- Pin-based linear fluorescent
- Pin-based compact fluorescent
- GU-24 other than LEDs
- Inseparable SSL luminaires with colored light sources for decorative lighting purpose

### Outdoor
- Pulse-start metal halide
- High pressure sodium
- Inseparable SSL luminaires installed outdoors

## JA8 High Efficacy Lighting: Lamps and Light Sources

- Light sources in ceiling recessed downlight luminaires.*
- LED luminaires with integral sources
- Screw-based LED lamps (A-lamps, PAR lamps, etc.)
- Pin-based LED lamps (MR-16, AR-111, etc.)
- GU-24 based LED light source
- Any source or luminaire not listed elsewhere on this table

## Recessed Downlight Luminaires in Ceilings

- Shall not have screw based sockets
- Shall contain JA8- certified light sources
- Shall meet all performance requirements in §150.0(k)1C
Joint Appendices Chapter 8
“JA8-2016” or “JA8-2016-E” LAMP

A list of compliant products will be found at: https://cacertappliances.energy.ca.gov
**Lighting Controls**

### Rooms in Home

#### Hallways & Closets
- Switch, dimmer or vacancy sensor

#### Kitchens
- Under cabinet lighting switched separately*
- **High efficacy:** Switch, dimmer or vacancy sensor
- **JA8-2016/JA-2016-E:** Dimmer or vacancy sensor

#### Bathrooms, Utility/Laundry Rooms, Garage
- One luminaire must be on vacancy sensor
- 2nd luminaire:
  - **High efficacy:** Switch, dimmer or vacancy
  - **JA8-2016/JA-2016-E:** Dimmer or vacancy

#### All Other
- **High efficacy:** Switch, dimmer or vacancy sensor
- **JA8-2016/JA-2016-E:** Dimmer or vacancy sensor

---

*Applies to all rooms types*
Can an LED A-19 installed in a downlight be considered compliant if it is certified to the Energy Commission as appropriate for enclosed luminaires? (JA8-2016-E)
Outdoor Lighting

Must be high efficacy
Must have manual ON/OFF control
Must be controlled by either:

1. Photocell and motion sensor (6 hour override allowed); or
2. Astronomical time clock (6 hour override allowed)
3. EMCS with same functionality as astronomical time clock (no override allowed)
Appliance Efficiency Regulations (Title 20)

Prior to sale, regulated appliances within the scope of Title 20 requiring the submission of certification data must meet all the applicable requirements found in Sections 1601-1609 of the California Appliance Efficiency Regulations and be listed in the appliance efficiency database.

(cacertappliances.energy.ca.gov)
**T20 Regulated Lighting Products**

<table>
<thead>
<tr>
<th>Federal and State Standards for Federally-Regulated Appliances</th>
<th>State Standards for Non-Federally-Regulated Appliances</th>
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<tr>
<td>Fluorescent Lamp Ballasts</td>
<td>State-Regulated Incandescent Reflector Lamps</td>
</tr>
<tr>
<td>General Service Fluorescent Lamps</td>
<td>State-Regulated General Service Incandescent Lamps</td>
</tr>
<tr>
<td>Incandescent Reflector Lamps</td>
<td>General Service Lamps, and Modified Spectrum</td>
</tr>
<tr>
<td>Medium Base Compact Fluorescent Lamps</td>
<td>Incandescent Lamps</td>
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<td>General Service Incandescent Lamps and Modified Spectrum</td>
<td>GU-24 Base Lamps</td>
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<td>General Service Incandescent Lamps</td>
<td>Illuminated Exit Signs</td>
</tr>
<tr>
<td>Candelabra Base Incandescent Lamps and Intermediate Base</td>
<td>Self-Contained Lighting Controls</td>
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<td>Intermediate Base Incandescent Lamps</td>
<td>Metal Halide Luminaires</td>
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<tr>
<td>Emergency Lighting and Self-Contained Lighting Controls</td>
<td>Under-Cabinet Luminaires</td>
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<tr>
<td>Traffic Signal Modules and Traffic Signal Lamps</td>
<td>(commercial office only)</td>
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<tr>
<td>Torchières</td>
<td>Portable Luminaires</td>
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<td>Metal Halide Lamp Fixtures</td>
<td>GU-24 Adaptors</td>
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## General Service LED Lamps

### 1605.3(k)(2): All state-regulated LED lamps

<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Minimum Compliance Score</th>
<th>Minimum Efficacy Lumens per Watt</th>
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<tr>
<td>January 1, 2018</td>
<td>282</td>
<td>68</td>
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<tr>
<td>(Tier 1)</td>
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<td></td>
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<tr>
<td>July 1, 2019</td>
<td>297</td>
<td>80</td>
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<td>(Tier 2)</td>
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</table>

**Compliance score:**

**Efficacy + (2.3 x CRI)**
State-regulated LED lamps

**Base:** E12, E17, E26, or GU-24  
**Output:** less than 2,600 lumens  
**CCT:** between 2200 K and 7000 K  
**Duv:** between -0.012 and 0.012
### Selected Spec Comparison: A19

<table>
<thead>
<tr>
<th></th>
<th>Energy Star 2.0</th>
<th>JA8, T24 2016</th>
<th>Title 20</th>
<th>CA Quality Spec</th>
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<td><strong>Effective date</strong></td>
<td>June 1, 2016</td>
<td>January 1, 2017</td>
<td>Tier 1:</td>
<td>November 21, 2014</td>
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<td>January 1, 2018</td>
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<td></td>
<td></td>
<td></td>
<td>Tier 2: July 1, 2019</td>
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<tr>
<td><strong>CRI</strong></td>
<td>CRI ≥ 80</td>
<td>CRI ≥ 90</td>
<td>Lamps ≥ 150 lumen: CRI ≥ 82</td>
<td>CRI ≥ 90</td>
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<tr>
<td><strong>R1 – R8</strong></td>
<td>-</td>
<td>-</td>
<td>Minimum score of 72 for each individual color sample R1-R8.</td>
<td>-</td>
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<tr>
<td><strong>R9</strong></td>
<td>&gt; 0</td>
<td>≥50</td>
<td></td>
<td>&gt; 50</td>
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<tr>
<td><strong>Flicker</strong></td>
<td>No minimum flicker performance requirement</td>
<td>Percent flicker ≤30% at frequencies less than 200Hz, when tested at 100% and 20% light output, with test method</td>
<td>Dimmability not required for all lamps. Products claiming incandescent equivalency must be dimmable. Products claiming dimmability must comply with JA10.</td>
<td>&quot;Flicker free&quot; from 10% to 100%, no specific test method or criteria</td>
</tr>
</tbody>
</table>
Small Diameter Directional Lamps (SDDLS)

Sections 1605.3 (k)

Effective January 1, 2018

Minimum rated life: 25,000 hours based on lumen maintenance and time to failure test procedure

Meet one of the following requirements:

– Luminous efficacy of ≥ 80 lumens per watt.
– Luminous efficacy ≥ 70 lumens per watt and CRI + Efficacy ≥ 165
A website developed by the Statewide Codes & Standards Program to help you meet the requirements of Title 24, Part 6. We offer **FREE:**

**Ace™ Tools™**
A variety of tools to help you identify the forms, installation techniques, and building energy standards relevant to building projects in California.

**Ace™ Training™**
Classroom and online trainings on Title 24, Part 6.

**Ace™ Resources™**
Fact Sheets, Trigger Sheets, Checklists, and FAQs to help you understand when Title 24, Part 6 is “triggered” and how to correctly comply when it is.

EnergyCodeAce.com
<table>
<thead>
<tr>
<th><strong>Ace Tools™</strong></th>
<th>Description</th>
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<tr>
<td><strong>Ace Navigator™</strong></td>
<td>Step-by-step guide to the Title 24, Part 6 compliance process in easy-to-follow flowchart format</td>
</tr>
<tr>
<td><strong>Ace Forms™</strong></td>
<td>Aids in determining which compliance forms are applicable to your specific project</td>
</tr>
<tr>
<td><strong>Ace Reference™</strong></td>
<td>Helps you navigate the Standards using key word search capabilities, hyperlinked tables and related sections</td>
</tr>
<tr>
<td><strong>Ace Installation™</strong></td>
<td>A “field guide” to assist you in identifying proper installation techniques and visual aides for some components commonly installed incorrectly</td>
</tr>
<tr>
<td><strong>Crack The Code Industry Workshop™</strong></td>
<td>Workshop packages to help Building Departments facilitate trainings for local installation contractors</td>
</tr>
</tbody>
</table>
SECTION 150.1 — PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR NEWLY CONSTRUCTED RESIDENTIAL BUILDINGS

(a) Basic Requirements.

New low-rise residential buildings shall meet all of the following:
1. The requirements of Sections 150.1 through 150.10 shall be applicable to new residential buildings.
2. The requirements of Section 150.8 (mandatory features).
3. Either the performance standards or the prescriptive standards as set forth in this section for the climate zone in which the building will be located. Climate zones are shown in Reference Joint Appendix JA2—Weather Climate Data.

EXCEPTION to Section 150.1(a). If a single contiguous subdivision or tract falls in more than one climate zone, all buildings in the subdivision or tract may be designed to meet the performance or prescriptive standards for the climate zone that contains 50 percent or more of the dwelling units.

NOTE: The Commission periodically updates, publishes, and makes available to interested persons and local enforcement agencies precise descriptions of the Climate Zones, which is available in Reference Joint Appendix JA2—Weather Climate Data.

4. For other provisions applicable to new low-rise residential buildings, refer to Section 150.2.

(b) Performance Standards.

A building complies with the performance standard if the energy budget calculated for the Proposed Design Building under Subsection 2 is no greater than the energy budget calculated for the Standard Design Building under Subsection 1.


The energy budget for a Standard Design Building is determined by applying the mandatory and prescriptive requirements to the Proposed Design Building. The energy budget is the sum of the TEV energy for space conditioning, mechanical ventilation and water heating.

2. Energy Budget for the Proposed Design Building.

The energy budget for a Proposed Design Building is determined by calculating the TEV energy for the Proposed Design Building. The energy budget is the sum of the TEV energy for space conditioning, mechanical ventilation and water heating. The energy budget for the Proposed Design Building is reduced if on-site renewable energy generation is installed, according to methods established by the Commission in the Residential ACHI Approval Manual.

3. Calculation of Energy Budget.

The TEV energy for both the Standard Design Building and the Proposed Design Building shall be computed by Compliance Software certified for the use by the Commission. The procedures for Compliance Software approval are documented in the Residential ACHI Approval Manual.

4. Compliance Demonstration Requirements for Performance Standards.

A. Certificate of Compliance and Application for a Building Permit. The application for a building permit shall include documentation pursuant to Sections 10-103(a)1 and 10-103(a)2 which demonstrates, using an approved calculation method, that the building has been designed so that its TEV energy use from dependable energy sources does not exceed the combined TEV energy for space conditioning, mechanical ventilation and water heating for the applicable Climate Zone.

EXCEPTION to Section 150.1(b)(4). A Multiple Orientation. A permit applicant may demonstrate compliance with the energy budget requirements of Section 150.1(a) and (b) for any orientation of the same building model if the documentation demonstrates that the building model with its proposed design and features would comply in each of the four cardinal orientations.

B. Field verification of installed features, materials, components, manufactured devices and system performance shall be documented on applicable Certificate of Installation pursuant to Section 10-103(a)3, and applicable Certificate of Verification pursuant to Section 10-103(d), in accordance with the following requirements when applicable:

1. SEER Rating. When performance compliance requires installation of a space conditioning system with a SEER rating that is greater than the minimum SEER rating required by Table 150.1-1, the installed system shall be field verified in accordance with the procedures specified in Reference Residential Appendix KAO 4.4.1.

2. EER Rating. When performance compliance requires installation of a space conditioning system that meets or exceeds a specified EER rating, the installed system shall be field verified in accordance with the procedures specified in Reference Residential Appendix KAO 4.4.1.

3. ILE or ILE Air Handler. When performance compliance requires installation of a low-velocity air-handler unit that meets the modifications in Reference Joint Appendix JA5, the installed air handler shall be field verified in accordance with the procedures specified in Reference Residential Appendix KAO 4.4.1.
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EnergyCodeAce.com/content/training
"Quick reference" component-by-component summaries of sections of 2013 Title 24, Part 6 "triggered" based on project scope.

"Quick reference" summaries of key requirements, forms, definitions and resources for implementing 2013 Title 24, Part 6

Step-by-step guidance for plans checks and field inspections

A list of useful links, telephone numbers and handy documents

FAQs on the program, the site and the code, and a place to submit your own questions
Non-res Lighting ALT Form

Coming soon!

- Dynamic
- Adobe Reader required
- Organized to help with Title 24, Part 6 lighting alteration compliance
What's New in Lighting in Title 24, Part 6 2016 and Title 20?

Nonresidential “What’s New”

Overview
Changes to the nonresidential requirements in the 2016 Building Energy Efficiency Standards (Energy Standards) largely follow ASHRAE 90.1 national standards and include energy conservation measures related to the building systems shown in Figure 1. The standards have been adopted, and once approved, will be implemented for projects permitted on or after January 1, 2017. For more detailed information, see the 2016 IECC Sheet.

Figure 1: 2016 Energy Standards: Interior Highways by ESC

In addition, the 2016 Energy Standards have set out to simplify and clarify several areas that were new in the 2013 Energy Standards, which were identified during the public comment period as needing clarification.

Compliance Manuals
The Compliance Manuals and other related manuals are being updated to reflect the adopted 2016 Energy Standards and are planned to be available in early 2016 on the ESC’s website.

In addition, Energy Code Ace is working with the California Energy Commission (CEC) to produce a suite of 2016 Energy Standards Application Guides, which will provide project examples and other information that may be helpful in applying the energy code requirements. Look for these and other new tools, training and resources on EnergyCodeACE.com during the summer of 2016.

ESC-EC’s, the state-funded nonresidential computer simulation tool, has been updated for the 2016 Energy Standards as well. A certified version is publicly available for free download now. This was developed early in order to give users time to utilize the software prior to the January 2017 implementation date.

Envelope Highlights
Prescriptive installation requirements for roofs and curtilages have become more stringent under the 2016 Energy Standards. Additionally, prescriptive insulation requirements have become more stringent for metal and wood-framed walls in certain climate zones.

Mandatory Measures — Section 120.7
Well Insulation levels have been changed to the following:
- Metal-framed: R-factor = 0.151 (R-13.5)/W-R2
- Metal-framed: R-factor = 0.151 (R-9.3)/W-R2
- All other mandatory insulation levels are unchanged. Additional exceptions apply for dedicated data centers.

Prescriptive Measures — Section 140.3
- Prescriptive envelope requirements in Title 24-3 have been updated for Nonresidential buildings.
- Prescriptive envelope requirements in Title 24-3 have been updated for High-Rise Residential and Hotels/Motels.
- The prescriptive Roof/Ceiling Insulation Trackoff for Aged Solar Reflectance Table 140.3 has been updated as shown below. Requirements apply to roof replacements as well as new installations.

Table 140.3 Nonresidential Roof U-Factor

<table>
<thead>
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<th>Aged Solar Reflectance</th>
<th>Building</th>
<th>Wood Framed and Other</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td>0.028</td>
<td>0.042</td>
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<td>0.033</td>
<td>0.047</td>
</tr>
<tr>
<td>0.04-25.0</td>
<td>0.033</td>
<td>0.047</td>
</tr>
<tr>
<td>All Other Zones</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0.038</td>
<td>0.040</td>
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<tr>
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</tr>
<tr>
<td>0.04-25.0</td>
<td>0.043</td>
<td>0.047</td>
</tr>
</tbody>
</table>

Process Equipment Highlights
New to the 2016 Energy Standards are mandatory energy saving requirements for escalators and elevators. Acceptance testing will be required for new or reconditioned elevators.

Elevators and Moving Walkways — Section 120.6(g)
- Escalators and moving walkways will be required to run at lower speeds when unoccupied (and therefore lower energy consuming state) while running at high traffic areas like airports, hotels, and transportation function areas.
- Elevators — Section 120.6(h)
- Energy efficient lighting. Lighting Power Density (LPD) of 0.6 W/ft2 maximum.
- Energy efficient fans. Ventilation fans for cabinets without space conditioning shall not exceed 0.33 w/ft3.
- Automatic shut-off controls on cab lighting and fans after 15 minutes of no service (stopped, unoccupied with doors closed).
- Lighting and ventilation must be operational during emergency stop situations while unoccupied with passengers.

Mechanical Highlights
Mandatory Equipment Efficiency — Section 110.4
Mandatory equipment efficiencies for air conditioning units have increased as of 1/1/2016. Chiller and DX equipment efficiencies have become more stringent.

Codebook Features — Section 120.3(i)
New mandatory requirements for Fault Detection and Diagnostics (FDD) on all economizers installed on new air-cooled packaged DX units with cooling capacity of 54,000 Btu/hr or greater. Stand alone or integrated FDD accepted per Section 2.3.2(b) of the 2016 Energy Standards.

HVAC System Controls — Sections 120.2 & 140.4
- Mandatory Direct Digital Controls (DDC): DDC shall be applied per Section 120.3(b) of the 2016 Energy Standards. Table A for new constructions, additions, and alterations. Control logic must be capable of monitoring several points including fan pressure, pump pressure, heating and cooling, have optimum start/stop controls, and perform automatic information transfer among other requirements.
- Mandatory Optimum Start/Stop Controls: The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint, the outdoor air temperature, and the amount of time prior to the scheduled occupancy. Additional requirements for mass radiant floor slab systems. Requirements per Section 120.2.9 of the 2016 Energy Standards.
- Prescriptive HVAC Shut-off Sensors for Windows and Doors: If windows or doors are left open for more than five minutes, sensors will adjust thermostats to disable the HVAC equipment by resetting the temperature setpoint to 55°F for mechanical heating and 90°F for mechanical cooling. Exemptions for doors with automatic closers or any space without thermostatic controls. Requirements per Section 140.4(c) of the 2016 Energy Standards.

Commissioning Highlights
A few important clarifications were made to the commissioning requirements in Section 120.8 of the 2016 Energy Standards.
- Commissioning is required for all new buildings with nonresidential conditioned space, including nonresidential spaces in hotels/motels and high-rise residential buildings.
- The Owner’s Project Requirements (OPR) must include building envelope performance expectations under the 2016 Energy Standards.
- Section 10.103 in Part 1 specifies that the Design Reviewer must be a licensed architect or licensed engineer in addition to a professional engineer.

Indoor Lighting Highlights
The interior lighting mandatory and prescriptive measures, as well as updates to the calculation methodologies are included below.

Prescriptive Calculation Methodology — Section 140.6
- Complete Building Method: Allowed Lighting Power Densities are reduced by 0.1 or less for half of building types listed in Table 140.6-B.
- Area Category Method: Allowed Lighting Power Densities are reduced by 0.2 or less for less than 12% of functional areas in Table 140.6-C.
- Tailored Method: Lighting Power Density Values updated per Table 140.6-D. Allowances in Table 140.6-D remain unchanged.

Indoor Lighting Controls — Sections 130.1.8 & 140.6
- Mandatory Shut-off Controls: Additional exception of 0.1 w/ft2 for entries in any building.
- Mandatory Multi-level Controls: Enclosed areas 100 ft2 or greater with a general lighting load greater than 0.5 w/ft2 must have multi-level controls as shown in Table 130.1-A. Some exceptions apply for classrooms, public restrooms, and areas with one lightbrain.
- Mandatory Partial-ON Occupancy Sensor: For areas requiring occupant sensing controls per Section 130.1(b) of the Standards (offices ≤ 250 ft2, multipurpose rooms ≤ 1,000 ft2, classrooms, and conference rooms), and multi-level controls per Section 130.1(d) of the 2016 Energy Standards, the occupant sensing controls shall function as partial ON (the 50-75% of controlled power) OR vacancy sensor (only manual ON). Where no multi-level controls are required per Section 130.1(b) of the 2016 Energy Standards, an automatic full-on occupancy sensor is acceptable.
- Control Credits: Power Adjustment Factors (PAF) listed in Table 140.5-A have been updated and the following options have been added.
- Institutional Tuning: Limits maximum output or power draw of controlled lighting to 75% or less of full output draw.
- Daylight dimming plus OFF control: Turns lighting completely OFF when the daylight is greater than 50% of general lighting system at full power.
What’s New in Lighting in Title 24, Part 6 2016 and Title 20?

RESIDENTIAL LIGHTING

California’s new residential Building Energy Efficiency Standards now affect focus on severly areas to improve the energy efficiency of new construction buildings. The most significant improvements address the California Energy Commission estimates that the 20% standards will reduce electric savings annually and reduce statewide greenhouse gas emissions by 2030. California’s new residential energy codes. These standards necessitate a major shift towards meeting California’s mandatory energy codes. 2016 updates what and how energy codes and building standards in 2016 codes. This publication offers an overview of the new requirements for energy codes.

MAJOR CHANGES

REDUCTION TO LIGHTING POWER DENSITY VALUES

Lighting power density changes have been recalculated. The new lighting density limits for residential and commercial occupancy do not limit the power consumption of lighting fixtures. The new limits are based on occupancy levels and lighting levels. The new limits provide more flexibility for designers and builders.

UPDATING TO NEW LIGHTING FACTORS

The 2016 Standards contain the new lighting factors that are based on occupancy levels and lighting levels. The new lighting factors provide more flexibility for designers and builders.

SIMPIMIZED CONTROL REQUIREMENTS

Lighting control requirements have been simplified. Central systems are no longer required. Other occupancy control requirements are no longer required. The new requirements are based on occupancy levels and lighting levels.

PLACEMENT OF LIGHTING

The placement of lighting fixtures has been revised. New and existing buildings are no longer required to comply with the new requirements. Other occupancy control requirements are no longer required.

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Thank You

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