SECTION 119 – MANDATORY REQUIREMENTS FOR LIGHTING CONTROL DEVICES, BALLASTS, AND LUMINAIRES

Any lighting control device, ballast, or luminaire subject to the requirements of Section 119 shall be installed only if the manufacturer has certified to the Energy Commission, that the device complies with all of the applicable requirements of Subsections (a) through (f) and Subsections (h) through (j), and if the device is installed in compliance with Subsection (g)(m). Lighting control devices may be individual devices or systems consisting of two or more components. For control systems consisting of two or more components, the manufacturer shall individually identify each of the components required for the system to comply with Section 119.¹

(a) All Devices: Instructions for Installation and Calibration. The manufacturer shall provide step-by-step instructions for installation and start-up calibration of the device.

(b) All Devices: Status Signal. The device shall have an indicator that visibly or audibly informs the device operator that it is operating properly, or that it has failed or malfunctioned.² EXCEPTION to Section 119(b): Photosensor or other devices where a status signal is infeasible because of indicator lights integral to lighting control devices shall consume no more than one watt of power per indicator light.³

(c) Automatic Time Switch Control Devices. Automatic time switch control devices or system shall:

1. Be capable of programming different schedules for weekdays and weekends; and
2. Have program backup capabilities that prevent the loss of the device’s program schedules for at least 7 days, and the device’s time and date setting for at least 72 hours if power is interrupted.⁴

(d) Occupant Sensors, Motion Sensors, and Vacancy Sensors.⁵ Occupant sensors, motion sensors, and vacancy sensors shall be capable of automatically turning off all the lights in an area no more than 30 minutes after the area has been vacated, and shall have a visible status signal that indicates that the device is operating properly or that it has failed or malfunctioned.² In addition, ultrasonic and microwave devices shall have a built-in mechanism that allows calibration of the sensitivity of the device to room movement in order to reduce the false sensing of occupants, and shall comply with either Item 1 or 2 below, as applicable:

1. If the device emits ultrasonic radiation as a signal for sensing occupants within an area, the device shall:
   A. Have had a Radiation Safety Abbreviated Report submitted to the Center for Devices and Radiological Health, Federal Food and Drug Administration, under 21 Code of Federal Regulations, Section 1002.12 (1996), and a copy of the report shall have been submitted to the California Energy Commission; and
   B. Emit no audible sound; and
   C. Not emit ultrasound in excess of the decibel (dB) values shown in TABLE 119-A, measured no more than five feet from the source, on axis.
2. If the device emits microwave radiation as a signal for sensing occupants within the area, the device shall:
   A. Comply with all applicable provisions in 47 Code of Federal Regulations, Parts 2 and 15 (1996), and have an approved Federal Communications Commission Identifier that appears on all units of the device and that has been submitted to the California Energy Commission; and
   B. Not emit radiation in excess of one milliwatt per square centimeter measured at no more than five centimeters from the emission surface of the device; and
   C. Have permanently affixed to it installation instructions recommending that it be installed at least 12 inches from any area normally used by room occupants.

e) Multi-Level Occupant Sensor. Multi-level occupant sensors shall have an automatic OFF function that turns off all the lights, and either an automatic or a manually controlled ON function capable of meeting all the multi-level and uniformity requirements of Section 131(b) for the controlled lighting. The first stage shall be capable of activating between 30-70% of the lights in a room either through an automatic or manual action. After that event occurs the device shall be capable of all of the following actions when manually called to do so by the occupant: ²
1. Activating the alternate set of lights.
2. Activating 100% of the lights.
3. Deactivating all lights.

(e) Automatic Daylighting Control Devices. Automatic daylighting control devices used to control lights in daylit zones shall:

1. Be capable of reducing the light output power consumption of the general lighting in the controlled area by at least two thirds one half in response to the availability of daylight while maintaining relatively uniform illumination throughout the area; and
2. If the device is a dimmer provides dimming, provide electrical outputs to lamps for which the light has a visual flicker less than 30 percent for frequency and modulation reduced flicker operation through the dimming range and without causing premature lamp failure; and
3. If the devices reduce lighting in control steps, incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes and have sufficient separation (a manual or automatic means of adjusting the deadband to provide separation) of on and off points for each control step to prevent cycling; and
4. If the devices have a time delay, have the capability for the time delay to be over ridden or set to less than 5 seconds time delay for the purpose of set up and calibration, and is placed in calibration mode, automatically restore its time delay settings to normal operation programmed time delays after no more than 60 minutes; and
5. Have a setpoint control that easily distinguishes settings to within 10% of full scale adjustment; and
6. Have a light sensor that has a linear response with 5% accuracy over the range of illuminances measured by the light sensor; and
7. Have a light sensor that is physically separated from where calibration adjustments are made, or is capable of being calibrated in a manner that the person initiating calibration is remote from the sensor during calibration to avoid influencing calibration accuracy, and
8. If the device is a continuous dimming control, have a fade time of at least five seconds to change from full brightness to full dimming evenly over the fade time; and
9. If the device is a stepped switching control device, show the status of lights in the controlled zone by an indicator on the control device; and
10. If the controlled electric lighting cannot be viewed from where setpoint adjustments are made, and if the device is a dimming control device, display the light level measured by the light sensor during calibration, if the controlled electric lighting cannot be viewed from where setpoint adjustments are made.

Exception to Section 119(e): 7 & 8 9 & 10: If the control device is part of a networked system with a central display of each control zone status, the status indicator or light level display on each individual control device shall not be required if control setpoint adjustments can be made at the central display.

(g) Interior Photosensors. Interior photosensor shall not have a mechanical slide cover or other device that permits easy unauthorized disabling of the control, and shall not be incorporated into a wall-mounted occupant-sensor.

(g) Installation in Accordance with Manufacturer's Instructions. If an automatic time switch control device, occupant sensor, automatic daylighting control device, or interior photosensor is installed, it shall comply with both Items 1 and 2 below.

A. Be installed so that automatic daylighting control devices control only luminaires within the daylit area; and
B. Have photosensor that are either ceiling mounted or located so that they are accessible only to authorized personnel, and that are located so that they maintain adequate illumination in the area in accordance with the designer's or manufacturer's instructions.
1. The device shall be installed in accordance with the manufacturer's instructions; and

2. Automatic daylighting control devices shall:
   1. Contain at least 2 separately programmable steps (relays) per zone that reduces illuminance in a relatively uniform manner as specified in Section 131(b); and
   2. Have a separate offset control for each step of 1 to 240 minutes; and
   3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and
   4. Store time zone, longitude and latitude in non-volatile memory schedules for at least 7 days, and store date and time settings for at least 72 hours, if power is interrupted; and
   5. Display date/time, sunrise and sunset, and switching times for each step; and
   6. Have an automatic daylight savings time adjustment; and
   7. Have automatic time switch capabilities specified in Section 119 (c).

(i) Automatic Multi-Level Daylighting Controls. An automatic multi-level daylighting control used to control lighting in daylit zones shall:
   1. Meet all the requirements of section 119 (e) for automatic daylighting control devices; and
   2. Meet all the multi-level and uniformity requirements of section 131 (b); and
   3. Have a light sensor that is physically separated from where setpoint adjustments are made; and
   4. Have controls for calibration adjustments to the lighting control device that are readily accessible to authorized personnel.

(j) Outdoor Astronomical Time-switch Controls. Outdoor astronomical time-switch controls used to control outdoor lighting as specified in Section 132 (c) shall:
   1. Contain at least 2 separately programmable channels per function area; and
   2. Have the ability to independently offset the on and off times for each channel by 0 to 99 minutes before or after sunrise or sunset; and
   3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and
   4. Store astronomical time parameters (used to develop longitude, latitude, time zone) for at least 7 days, and store date and time settings for at least 72 hours, if power is interrupted; and
   5. Display date/time, sunrise and sunset; and
   6. Have an automatic daylight savings time adjustment; and
   7. Have automatic time switch capabilities specified in Section 119 (c).

(i) Manual-On Occupant Sensor (Residential) (Vacancy Sensor). A residential manual-on occupant sensor (also known as a vacancy sensor) used to comply with § 150(k) shall be a device or system which meets all of the following requirements:
   1. Turns off the lighting automatically within 30 minutes or less after the room has been vacated in response to the absence of occupants in the room, and
   2. Has a visible status signal in accordance with Section 119(d), and
   3. Shall not turn on the lighting automatically, except the sensor shall have a grace period of 15 seconds to 30 seconds to turn on the lighting automatically after the sensor has timed out, and
4. Shall not have an override switch that disables the occupant sensor, and
5. Shall not have an override switch that converts the sensor from a manual-on to an automatic-on system.

(k) **Dimmers.** Dimmers used to control lighting:  
1. Shall be capable of reducing energy consumption by a minimum of 65 percent when the lighting system is 100 percent dimmed, and
2. Shall operate so that the light has a visual flicker of less than 30 percent for frequency and modulation, and
3. Shall be listed by Underwriters Laboratories or other testing laboratories recognized by the International Code Council (ICC), and
4. If the device is used on circuits with more than one switch, shall not be able to be overridden by any other switches, and
5. If the device is a stepped dimmer, shall include an off button to turn lights completely off.

(l) **Track Lighting Integral Current Limiter.** Integral current limiters used to comply with Section 131(c) shall:  
1. Be designed to be permanently attached to the track so that the track will be irreparably damaged if the current limiter were to be removed after installation into the track; and
2. Have the volt-ampere (VA) rating of the current limiter clearly marked on the circuit breaker visible for the building officials’ field inspection without opening coverplates, fixtures, or panels, and also on a permanent factory-installed label inside the wiring compartment; and
3. Employ tamper resistant fasteners for the cover to the wiring compartment; and
4. Have a conspicuous permanent factory installed label affixed to the inside of the wiring compartment warning against removing, tampering with, rewiring, or bypassing the device.

(m) **High Efficacy LED Luminaires.** To qualify as high efficacy for compliance with Section 150(k), a light emitting diode (LED) luminaire shall meet the minimum efficacy requirements in Table 150-C and luminaire power shall be determined as specified by Section 130(e).

(n) **Ballasts for Residential Luminaires.** To qualify as high efficacy for compliance with Section 150(k), any ballast in a residential indoor luminaire shall meet all of the following conditions:
1. Have a minimum rated life of 30,000 hours at rated case temperature, tested in accordance with UL 1598, Section 19.15; and
2. Have a ballast factor of not less than 0.90 for non-dimming ballasts and a ballast factor of not less than 0.85 for dimming ballasts; and
3. Have less than 30% total harmonic distortion; and
4. Have a power factor of not less than 0.90.

(o) **Dimmable Fluorescent Ballasts for Power Adjustment Factor.** To qualify for the Power Adjustment Factor in Section 146(a) and Table 146-C, ballasts for linear fluorescent lamps shall be electronic, dimmable, and shall meet the minimum Relative System Efficiency (RSE) in Table 146-D.

### TABLE 119-A ULTRASOUND MAXIMUM DECIBEL VALUES

<table>
<thead>
<tr>
<th>MIDFREQUENCY OF SOUND PRESSURE THIRD-OCTAVE BAND (in kHz)</th>
<th>MAXIMUM dB LEVEL WITHIN THIRD-OCTAVE BAND (in dB reference 20 micropascals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>80</td>
</tr>
<tr>
<td>20 or more to less than 25</td>
<td>105</td>
</tr>
<tr>
<td>25 or more to less than 31.5</td>
<td>110</td>
</tr>
<tr>
<td>31.5 or more</td>
<td>115</td>
</tr>
</tbody>
</table>
End Notes

The following notes are an explanation of the changes that have been made. These notes are not part of the Standard.

1 Changes proposed for clarification and to accommodate the evolution of controls from being only individual devices to the increased use of control systems. Other edits for clarification.

2 This requirement has been deleted from here and moved to Section 119(d) because they only apply to occupant sensors.

3 Indicator lights now require very little power so that this exception is no longer needed.

4 This language is proposed in response to industry comments and staff concerns that there is currently no standard for the maximum power allowable for lighting control indicator lights. This proposed wattage is based on input from lighting control manufacturers who report that indicator lights typically use only a fractional wattage LED.

5 Proposed changes for clarification as a result of discussions with NEMA.

6 Proposed for clarification. The term “vacancy sensor” is a recently developed term being used by several manufacturers to identify automatic-on / manual-off occupancy sensors used to comply with Section 150(k). This proposed language is to be consistent with a new industry convention.

7 This language has been moved from Section 119(b) and inserted here because the requirement applies only to occupant sensors.

8 This information has been copied from Section 146(a)(4)(d) for clarity.


10 For clarity as recommended by NEMA

11 For clarity. This language was taken from the existing definition of Reduced Flicker Operation in Section 101.

12 For clarity in response to comments received by NEMA.

13 For clarity in response to comments received by NEMA.

14 NEMA has expressed concern about this language. However, the existing language is appropriate. We have concluded that it will be best for any confusion with this language to be clarified in the 2008 Nonresidential Compliance Manual.

15 As proposed by HMG in PG&E CASE initiative and discussed with NEMA for clarity

16 As proposed by HMG in PG&E CASE initiative and discussed with NEMA for clarity

17 For clarity in response to comments received by NEMA

18 This information has been moved to Section 130(b) and 150(k) for clarity.

19 This information has been moved to Section 131(c) for clarity.

20 For clarity and in response to comments received by NEMA.

21 Deleted as proposed by PG&E CASE initiative.

22 For clarity and in response to comments received by NEMA.

23 Language moved from Section 150(k) for clarity.

24 This language was proposed by industry upon request by staff.

25 This language was copied from the 2005 Nonresidential Compliance Manual with additional edits and requirements in response to industry recommendations.