



What Are Lighting Controls for Credit?

Credits are available when lighting controls not mandated by California's Building Energy Efficiency Standards (Energy Standards), Title 24, Part 6 are installed to achieve additional reduction in lighting power.

Why?

In offering these credits, the Energy Standards encourage the installation of controls that exceed the mandatory minimum requirements for nonresidential interior lighting.

Relevant Code Sections

- [Section 110.9](#) – Mandatory Requirements for Lighting Controls and Systems, Ballasts, and Luminaires
- [Section 130.0\(d\)](#) – Lighting Systems and Equipment and Electrical Power Distribution Systems, Lighting Controls
- [Section 130.1](#) – Mandatory Indoor Lighting Controls
- [Section 130.4](#) – Lighting Control Acceptance and Installation Certificate Requirements
- [Section 140.6\(a\)2](#) – Prescriptive Requirements for Indoor Lighting, Calculation of Actual Indoor Lighting Power Density, Reduction of Wattage through Controls
- [Section 140.6\(a\)3](#) – Prescriptive Requirements for Indoor Lighting, Calculation of Actual Indoor Lighting Power Density, Lighting Wattage Excluded
- [Nonresidential Reference Appendix NA7](#) – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes

Relevant Compliance Forms

- [NRCC-LTI-02-E](#): Indoor Lighting Controls Worksheet
- [NRCI-LTI-01-E](#): Indoor Lighting
- [NRCI-LTI-02-E](#): EMC Control System or Lighting Controls System
- [NRCI-LTI-05-E](#): Power Adjustment Factors
- [NRCA-LTI-02-A](#): Lighting Controls
- [NRCA-LTI-03-A](#): Automatic Daylighting Control
- [NRCA-LTI-04-A](#): Demand Responsive Lighting Control
- [NRCA-LTI-05-A](#): Institutional Tuning PAF
- Which NRCI and NRCA forms are required is based on controls installed and will vary by project



Wattage Reduction through Controls: The Power Adjustment Factor



A Power Adjustment Factor (PAF) is an adjustment, or credit, to the actual installed lighting power in a space. Indoor lighting power of permanently installed general lighting in the function areas listed in Table 1 is allowed to be reduced by multiplying the controlled watts by the applicable PAF. With a PAF, a fraction of the installed lighting power in a space is not counted toward the building's total installed lighting load when performing compliance calculations.

These allowances allow more flexibility when designing compliant spaces. Qualifying PAFs may be used to help meet Prescriptive lighting power requirements or, when using the Performance compliance method, to tradeoff lighting performance beyond minimum levels with other measures.

To qualify for the reduction of lighting power through installation of specific lighting controls:

- Per [Section 140.6\(a\)2B](#), all mandatory requirements include: [Sections 110.9](#) and [130.0 - 130.5](#)
- The installation shall comply with the applicable requirements in [Section 140.6\(a\)2](#)
- Lighting measures must be permanently installed non-residential general lighting
- At least half of the light output of the controlled luminaire must be within the applicable area
- Only one PAF may be used for each qualifying luminaire unless noted otherwise

Note that:

- Several specific lighting applications may be excluded from actual indoor lighting power density as listed in [Section 140.6\(a\)3](#)
- Lighting controls that are required for compliance with Part 6 shall not be eligible for a PAF



Type Of Control	Type Of Area		Factor
1. Daylight Dimming plus OFF Control	Luminaires in skylit daylit zone or primary sidelit daylit zone		0.10
2. Occupant Sensing Controls in Large Open Plan Offices	In open plan offices > 250 ft ² : One sensor controlling an area that is:	No larger than 125 ft ²	0.40
		From 126 to 250 ft ²	0.30
		From 251 to 500 ft ²	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	All building types less than 10,000 ft ² . Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF		0.05

Table 1: Lighting Power Adjustment Factors
Source: [Table 140.6-A](#)

PAF-Eligible Lighting Controls

When installed in spaces described in Table 1, the following controls are eligible for PAF credit:

- 1. Daylight Dimming plus OFF Control:** A PAF credit of 0.10 is allowed for dimming systems that shut off luminaires when the illuminance through daylight alone reaches 150% of the design illuminance of the electric lighting. Most dimmable ballasts limit the minimum light output to 10% - 20% of full light, depending on luminaire type. Available only for luminaires in the primary sidelit daylight zone and the skylit daylight zone.
- 2. Occupant Sensing Controls:** Reduction in general lighting wattage is allowed when occupant sensing controls are installed in large open plan offices that contain workstations, and with an area greater than 250 ft². PAF credits range from 0.20 to 0.40, depending on how much area is controlled by a single occupant sensor. See Table 1 for details.
To qualify for this credit, the occupant sensing controls should not be triggered by movements outside the control area.
For example, if one occupant sensor controls general lighting of 120 watts in an open office area of 200 ft², the adjusted lighting power is 84 watts, based on the following formula:
 $120W * (1-0.3) = 84W$.
- 3. Institutional Tuning:** PAF credits are available when the lighting system is tuned to provide no greater than 85% of the full light output or power draw.
- 4. Demand Responsive Control:** When installed in buildings 10,000 ft² and smaller, demand responsive controls qualify for PAF credit. PAFs for these controls can be combined with PAFs for other controls.

Non-habitable spaces or spaces with lighting power less than 0.5 W/ft² cannot be used for calculating total lighting power of the building. Reduction in lighting levels in response to a demand response signal shall be automatic and shall be in accordance with [Table 130.1-A](#).

Forms: Which and When

Along with a Building Permit Application, the following forms are required.

During Design:

Indoor Lighting

- **NRCC-LTI-02-E** – Indoor Lighting Controls Worksheet
 - Completed and signed by permit applicant (designer, installing contractor or building owner)
 - Submitted by permit applicant at permit application or plan check

During Construction:

Indoor Lighting

- **NRCI-LTI-01-E** – Indoor Lighting
 - Completed and signed by installing contractor
 - Submitted at initial inspection or final inspection
- **NRCI-LTI-02-E** – EMC System or Lighting Control System
 - Completed and signed by installing contractor
 - Submitted at initial inspection or final inspection
- **NRCI-LTI-05-E** – Power Adjustment Factors
 - Completed and signed by installing contractor
 - Submitted at initial inspection or final inspection
- **NRCA-LTI-02-A** – Lighting Controls
 - Completed and signed by Acceptance Test Technician
 - Submitted at final inspection
- **NRCA-LTI-03-A** – Automatic Daylighting Control
 - Completed and signed by Acceptance Test Technician
 - Submitted at final inspection
- **NRCA-LTI-04-A** – Demand Responsive Lighting Control
 - Completed and signed by Acceptance Test Technician
 - Submitted at final inspection
- **NRCA-LTI-05-A** – Institutional Tuning PAF
 - Completed and signed by Acceptance Test Technician
 - Submitted at final inspection

Notes:

- Which NRCI and NRCA forms are required is based on controls installed and will vary by project

For More Information

Primary Documents

- Energy Standards Section 130.1 – Mandatory Indoor Lighting Controls:
EnergyCodeAce.com/site/custom/public/reference-ace-2016/Documents/section1301mandatoryindoorlightingcontrols.htm
- Energy Standards Section 130.4 – Lighting Control Acceptance and Installation Certificate Requirements:
EnergyCodeAce.com/site/custom/public/reference-ace-2016/Documents/na95section1304lightingcontrolacceptanceandinstallationcertifica.htm
- Energy Standards Section 140.6 – Prescriptive Requirements for Indoor Lighting:
EnergyCodeAce.com/site/custom/public/reference-ace-2016/Documents/na114section1406prescriptiverequirementsforindoorlighting.htm
- Energy Standards Nonresidential Reference Appendix NA7 - Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes:
energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/appendixna7installationandacceptancerequirementsfornonresidentia.htm

California Energy Commission Information & Services

- Energy Standards Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov
- Online Resource Center:
energy.ca.gov/title24/orc/
 - The Energy Commission's main web portal for Energy Standards, including information, documents, and historical information

Additional Resources

- Energy Code Ace:
EnergyCodeAce.com
 - An online “one-stop-shop” providing free resources and training to help appliance and building industry professionals decode and comply with Title 24, Part 6 and Title 20. The site is administered by California's investor-owned utilities.
- Of special interest:*
- Title 24, Part 6 Fact Sheets
EnergyCodeAce.com/content/resources-fact-sheets/
 - Nonresidential Lighting Mandatory Controls
 - Electrical Power Distribution Systems

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