



LIGHTING ALTERATIONS

Under the 2016 Building Energy Efficiency Standards

The 2016 Building Energy Efficiency Standards (Energy Standards) focus on several key areas to improve the energy efficiency of newly constructed buildings, additions, and alterations to existing buildings. Indoor lighting alterations are now categorized into three types of projects: entire luminaire alterations, luminaire component modifications, and lighting wiring alterations. Outdoor lighting alterations have specific requirements based on the type of outdoor space in which they are installed. In addition, thresholds for project compliance with the Energy Standards have changed and more compliance options are now available for lighting retrofits.

WHAT'S NEW IN THE 2016 ENERGY STANDARDS



REGULATED LIGHTING ALTERATIONS

Nearly all types of lighting alteration projects are regulated under the Energy Standards. Indoor lighting alterations are listed under **§141.0(b)2I-K** and outdoor requirements are listed under **§141.0(b)2L**. Indoor lighting alterations are now categorized as one of three types of projects:

- Entire luminaire alterations
- Luminaire component modifications
- Lighting wiring alterations



UPDATED COMPLIANCE PATHS

A new compliance option for indoor lighting alterations has been added to the Energy Standards. Now, if an indoor lighting alteration results in significant lighting power reduction, either 50% or 35% depending on the application, there are reduced lighting control requirements.



EXEMPTIONS

Lighting alterations that include the addition of lighting controls may require acceptance testing. However, under the 2016 Energy Standards, a new exception states that when a lighting alteration project adds lighting controls to control 20 or fewer luminaires for the entire project, the project is exempt from acceptance testing.

Please watch the Energy Commission video series on Lighting Alterations offered at the Energy Commission's Online Resource Center: http://www.energy.ca.gov/title24/orc/lighting/2016_lighting.html The 2016 Building Energy Efficiency Standards may be found at <http://www.energy.ca.gov/title24/2016standards/>.

GENERAL REQUIREMENTS

Lighting alterations requirements are applicable to additions and alterations to existing buildings.

- Entire luminaire alterations [§141.0\(b\)2I](#)
- Luminaire component modifications [§141.0\(b\)2J](#)
- Lighting wiring alterations [§141.0\(b\)2K](#)
- Outdoor lighting alterations [§141.0\(b\)2L](#)

Entire Luminaire Alterations

Entire luminaire alterations involve a change to or addition of an entire luminaire. Requirements are found in [§141.0\(b\)2I](#). These alterations include:

- Removing & reinstalling 10% or more of the existing luminaires in an enclosed space.
- Removing existing luminaires and replacing them with new luminaires.
- Adding new luminaires.
- And adding, removing, or replacing, ceiling or walls along with any redesign of the lighting system.

An example of a project that falls under this category is an office building in which each fluorescent troffer is being replaced with an LED troffer.

Luminaire Component Modifications

Luminaire component modifications involve changes to certain parts of an existing luminaire. Luminaire component modification requirements are listed under [§141.0\(b\)2J](#). The scope of work under luminaire component modifications includes:

- Ballast or driver replacement and associated lamps.
- Permanently changing the light source type in an existing luminaire.
- Any changes to an existing luminaire's optical system.

An example of a regulated luminaire component modification would be a retrofit of fluorescent ballasts and lamps to new linear LED lamps and dimming drivers. In contrast, If the project only replaced fluorescent lamps with LED lamps and the fluorescent ballast was left in place as part of the functioning LED system, then this is not a regulated project. Lamp changes alone or even ballast or driver changes alone are considered repairs and are not regulated under the Energy Standards.

Lighting Wiring Alterations

Lighting wiring alterations involve changes to circuits or wiring connections between existing lighting components or the addition of new wiring. Lighting wiring alteration requirements are listed under [§141.0\(b\)2K](#). The scope of work under lighting wiring alterations includes:

- Adding new lighting circuits.
- Replacing, modifying, or relocating wiring between a switch and luminaire or a panel board and luminaire.
- Replacing existing lighting control panels, panel boards, or branch circuits with new products.

An example of this type of alteration is one where existing lighting zones are divided from two to four zones by recircuiting the space.

Outdoor Lighting Alterations

For outdoor lighting alterations, only altered or new luminaires must comply, while retrofits to existing luminaires that do not increase the lighting load are not regulated. Outdoor lighting alteration requirements are listed under [§141.0\(b\)2L](#). The minimum threshold for projects that do not increase the connected lighting load has been changed to the greater of five luminaires or 10 percent.

When the greater of five luminaires or 50 percent or more luminaires for a specific application are being replaced, the project must comply with lighting power and other requirements contained in [§140.7](#). However, if replacement luminaires have at least 40 percent lower power consumption as compared to the original luminaires, the alteration is not required to comply with the lighting power requirements in [§140.7](#).

COMPLIANCE PATHWAYS FOR INDOOR LIGHTING

There are three paths to compliance for indoor lighting alteration projects. Selection of the appropriate compliance option will depend on the lighting power of the new system.

Option 1: Power Reduction

The first and simplest path to compliance is achieved by reducing the power of installed luminaires. This compliance path is available for entire luminaire alterations and luminaire component modifications. This is a new compliance path for 2016. It's important to note that for this compliance path, no redesign of the interior space – like moving interior walls or replacing ceilings – can be made.

In offices, hotels, and retail spaces, the total combined wattage of the altered or replacement luminaires must be at least 50 percent lower than the existing luminaires. In all other spaces, the total combined wattage of the altered or replacement luminaires must be at least 35 percent lower than the existing luminaires.

Under this compliance path, there are reduced lighting control requirements. Projects must include manual on/off area controls and specific automatic shutoff controls. These projects are not subject to the multilevel, daylighting, and demand response control requirements because the power of the luminaires is being reduced substantially.

Option 2: LPD less than 85% of that Allowed

The next compliance pathway is available for projects that deliver a total lighting power that is 85 percent or less of that allowed under the Energy Standards per [§140.6](#). This compliance option is available for both entire luminaire alterations and luminaire component modifications. With this compliance option, qualifying projects must include manual on/off controls, bilevel or multi-level lighting controls, and shut-off controls. The 2016 Energy Standards now allow switching of alternate luminaires as an acceptable method of achieving the multilevel control requirement for projects complying under this option.

Option 3: LPD Between 85% and 100% of that Allowed

The last path to compliance states that alterations with proposed lighting power of more than 85 percent and up to 100 percent of that allowed by the 2016 Energy Standards must meet all applicable control requirements in [§130.1](#). These requirements apply to both entire luminaire alterations and luminaire component modifications.

Lighting Wiring Alterations

Lighting wiring alterations have a single path to compliance. These alterations must meet the lighting power allowance provided in [§140.6](#). Lighting wiring alterations require Area Controls, Shut-off controls, bilevel/full multi-level controls, and, automatic daylighting controls. Demand response control is not required for lighting wiring alterations.



COMPLIANCE PROCESS AND DOCUMENTS

Certificate of Compliance

Certificates of Compliance contain a list of all proposed lighting systems and features regulated by the Energy Standards. These forms are submitted to the building department during the permit phase of the project. They help plan checkers verify that the proposed lighting system alteration is in compliance with the Energy Standards. For indoor lighting alteration projects, use forms NRCC-LTI-01-E through NRCC-LTI-03-E. Additional Certificate of Compliance forms may be required based on scope of the lighting alteration.

For outdoor lighting alteration projects, use forms NRCC-LTO-01-E through NRCC-LTO-03-E.

With the 2016 Energy Standards, two new Certificates of Compliance are available. Certificate of Compliance NRCC-LTI-06-E is used to document existing indoor lighting systems when using the 50%/35% compliance path. Certificate of Compliance NRCC-LTO-04-E is used to document existing conditions for outdoor lighting alterations.

Certificate of Installation

Certificates of Installation list all regulated lighting systems and lighting controls installed as part of a project. The installing contractor identifies these items, and

certifies that they have been installed in compliance with the Energy Standards. Certificates of Installation must be posted or made available with the building permit for inspection, and a copy must be provided to the building owner at occupancy.

For indoor lighting alteration projects, use forms NRCI-LTI-01-E. For outdoor lighting systems use, NRCI-LTO-02-E. Additional Certificate of Installation forms may be required based on the scope of the lighting alteration.

Certificate of Acceptance

Certificates of Acceptance contain the results of all acceptance tests completed for regulated lighting controls. They also include a declarative statement stating the equipment and systems performed as required by the Energy Standards.

Certified acceptance test technicians use forms NRCA-LTI-02-A through NRCA-LTI-05-A to document acceptance tests for indoor lighting controls. They use NRCA-LTO-02-A to document acceptance test results for outdoor lighting controls. If a lighting alteration project adds lighting controls to control fewer than 20 luminaires, in total, the project is exempt from acceptance test requirements.



01/11/2017