

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

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Nonresidential Indoor Lighting Alterations

Under the 2019 Building Energy Efficiency Standards (Energy Code) **Section 141.0(b)2I**, nonresidential indoor lighting alterations requirements are applicable when 10 percent or more of luminaires in an enclosed space are altered. Alterations to the lighting system can include (but are not limited to) replacing, removing, reinstalling, relocating, adding, and modifying luminaires. Alterations to wiring that serves luminaires are considered lighting alterations.

There are three compliance pathways for nonresidential indoor lighting alterations. For the first two compliance pathways, alteration requirements depend on the proposed lighting power:

- Section 141.0(b)2Ii – Lighting power that is greater than 80 percent, and up to 100 percent of the lighting power allowance. The project must meet all mandatory lighting control requirements as applicable (manual area, multilevel,

automatic shut-OFF, automatic daylighting, and demand responsive controls).

- Section 141.0(b)2Iii – Lighting power that is 80 percent or less of the lighting power allowance. The project must meet manual area control requirements and automatic shut-OFF control requirements as applicable.

In the third compliance pathway, buildings or tenant spaces that are 5,000 square feet or less may utilize a different method of compliance if meeting specific criteria.

- Section 141.0(b)2Iiii - The lighting alteration must be a one-for-one luminaire alteration and the altered luminaire power must be at least 40 percent lower compared to the pre-alteration wattage. Lighting power allowance calculations are not utilized for this compliance approach. Control requirements include manual area controls and automatic shut-OFF controls as applicable.

Table 141.0-F includes the specific control requirements for each

compliance approach (Figure 1).

Some enclosed spaces may be exempt from the lighting alteration requirements. Here are some examples of spaces or alterations that do not trigger lighting alteration requirements:

- Enclosed spaces where less than 10 percent of luminaires are included in the lighting alteration.
- Enclosed spaces with one luminaire.
- Alterations that are limited to the addition of lighting controls to an existing lighting system.
- Alterations that are limited to the replacement of lamps, ballasts, or drivers. (Replacing lamps and ballast, or lamps and driver is considered an alteration.)

Refer to Section 141.0(b)2I for the specific language related to the indoor lighting alteration requirements and exceptions.

Table 141.0-F – Control Requirements for Indoor Lighting System Alterations

Control Specifications		Projects complying with Section 141.0(b)2Ii	Projects complying with Sections 141.0(b)2Iii and 141.0(b)2Iiii
Manual Area Controls	130.1(a)1	Required	Required
	130.1(a)2	Required	Required
	130.1(a)3	Only required for new or completely replaced circuits	Only required for new or completely replaced circuits
Multi-Level Controls	130.1(b)	Required	Not Required
Automatic Shut Off Controls	130.1(c)1	Required; 130.1(c)1D only required for new or completely replaced circuits	Required; 130.1(c)1D only required for new or completely replaced circuits
	130.1(c)2	Required	Required
	130.1(c)3	Required	Required
	130.1(c)4	Required	Required
	130.1(c)5	Required	Required
	130.1(c)6	Required	Required
	130.1(c)7	Required	Required
	130.1(c)8	Required	Required
Daylighting Controls	130.1(d)	Required	Not Required
Demand Responsive Controls	130.1(e)	Required	Not Required

Figure 1: Table 141.0-F Control Requirements for Indoor Lighting Alterations

Nonresidential Outdoor Lighting Cutoff Requirements

Under the 2019 Energy Code, **Section 130.2(b)** requires nonresidential outdoor luminaires with an initial lumen output of 6,200 lumens or greater to meet luminaire cutoff requirements. This is a change from the 2016 Energy Code cutoff requirements which

were triggered for luminaires rated for use with lamps greater than 150 lamp watts. The 2019 Energy Code also now defers to CALGreen Section 5.106.8 for backlight, upright, and glare (BUG) rating requirements.

CALGreen Code Section 5.106.8 includes additional BUG rating limits for area lighting and for lighting located within a distance of two mounting heights from property lines. The 2019 nonresidential certificate of compliance for outdoor lighting (NRCC-LTO-E) now documents these BUG rating requirements in Table G of the form (Figure 2). The form will automatically populate the maximum allowed BUG

COVID-19 Essential Workers

The CEC is available to support essential workers in the construction field. The CEC has clarified solar photovoltaic and energy storage installers as essential energy workers during COVID-19 response. For more information see the **CEC's clarification notice** and the message from Chair Hochschild on the **CEC's response to COVID-19**.

ratings from CALGreen Table 5.106.8 based on the user input lighting zone and mounting height distance of the luminaire from property lines. For more information on these requirements, refer to CALGreen Section 5.106.8 and Table 5.106.8.

2019 Energy Code Updated with Navigational Links

An **updated version of the 2019 Energy Code** is now available with embedded navigational links which include:

- Linked Table of Contents
- Linked section references in Table 100.0-A
- Links to sections and tables throughout the Energy Code
- Linked index to reference keywords in sections

Solar Assessment Tools

The 2019 Energy Code includes prescriptive and performance requirements to install solar photovoltaic (PV) systems for newly constructed low-rise residential buildings. As part of the PV requirement, installers must verify and document the shading conditions of the installed PV system as specified in **Reference Joint Appendix JA11.4**. The verification must be done using a solar assessment tool that is approved by the executive director. For a listing of approved tools and more information visit the **solar assessment tools web page**.

G. CUTOFF REQUIREMENTS (BUG)																
Table Instructions: Complete this table for fixtures of $\geq 6,200$ initial luminaire lumens indicated on Table F as needing to comply with Cutoff Requirements. Maximum lumens can be found in Title 24, Part 11, Section 5.106.8.																
01	02	03			04	05	06		07	08	09		10	11	12	
Name or Item Tag	Complete Luminaire Description	Backlight Rating ²			Uplight Rating ²			Glare Rating ²				Field Inspector				
		Mounting Height from Property Line ¹	Max Allowable Backlight Rating ²	Backlight Rating Per Design	Lighting Type	Max Allowable Backlight Rating ²	Uplight Rating Per Design	Mounting Height from Property Line ¹	Max Allowable Glare Rating ²	Glare Rating Per Design	Pass	Fail				
Ltg1	LED wall pack	> 2 MH from property line	No Limit	B3	Area Lighting	U0	U0	> 2 MH from property line	G3	G3	<input type="checkbox"/>	<input type="checkbox"/>				
Ltg2	LED cobra head	> 2 MH from property line	No Limit	B3	Area Lighting	U0	U0	> 2 MH from property line	G3	G3	<input type="checkbox"/>	<input type="checkbox"/>				
												Reset				

Figure 2: NRCC-LTO-E Table G

Q&A

Nonresidential Indoor Lighting

Do automatic daylighting control requirements apply to luminaires that fall partially within a daylight zone?

Yes. Luminaires that are at least 50 percent in a daylight zone must be included in the zone and meet applicable control requirements for that zone. If the luminaire is less than 50 percent in a daylight zone, it does not need to be included in the zone.

Are multi-segment linear lighting systems treated as a single luminaire?

No. For linear lighting systems that utilize individual luminaires or segments that can be connected together into a single run, each segment of the run is considered an

individual luminaire. For example, a 24-foot linear lighting run composed of three 8-foot segments is classified as three 8-foot luminaires.

Do automatic daylighting control requirements apply to linear lighting systems where there are multiple segments wired into a single run?

Yes. In a multi-segment run the individual luminaires and segments that fall within a daylight zone must be controlled separately within the daylight zone in which they fall. For example, a 24-foot run consisting of three 8-foot luminaires are mounted perpendicular to a window, if one 8-foot segment falls in a primary sidelit zone, one segment falls in a secondary sidelit daylight zone, and one segment is not in a daylight zone, each segment must be controlled separately in each type of daylight zone and separate from luminaires not in a daylight zone (Figure 3).

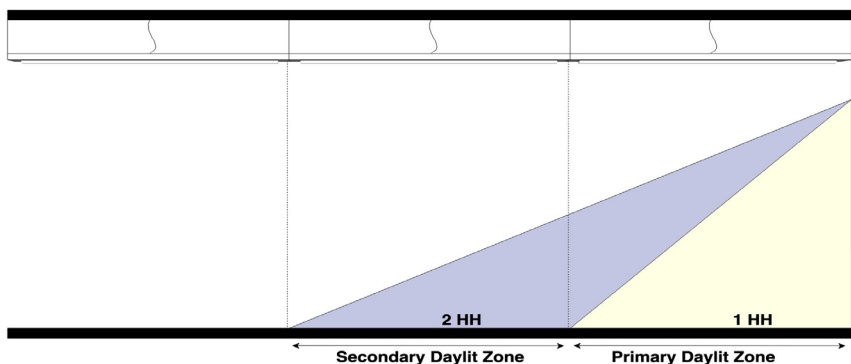


Figure 3: Linear Lighting Primary and Secondary Zones

Nonresidential Outdoor Lighting

For parking lot lighting projects with hardscape other than asphalt or concrete, does the project use the concrete general hardscape lighting power allowance from Table 140.7-A?

Yes. Parking lots where more than 50 percent of the paved surface is material other than asphalt or concrete may use the general hardscape lighting power allowance for concrete hardscape in **Table 140.7-A** of the 2019 Energy Code

TABLE 140.7-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 0 ¹	Lighting Zone 1 ¹	Lighting Zone 2 ²		Lighting Zone 3 ²		Lighting Zone 4 ³
	Asphalt/Concrete	Asphalt/Concrete	Asphalt	Concrete ²	Asphalt	Concrete ²	Asphalt/Concrete
Area Wattage Allowance (AWA)	No allowance ¹	0.018 W/ft ²	0.023 W/ft ²	0.025 W/ft ²	0.025 W/ft ²	0.03 W/ft ²	0.03 W/ft ²
Linear Wattage Allowance (LWA)		0.15 W/lf	0.17 W/lf	0.4 W/lf	0.25 W/lf	0.4 W/lf	0.35 W/lf
Initial Wattage Allowance (IWA)		180 W	250 W	250 W	350 W	350 W	400 W

¹Continuous lighting is explicitly prohibited in Lighting Zone 0. A single luminaire of 15 Watts or less may be installed at an entrance to a parking area, trail head, fee payment kiosk, outhouse, or toilet facility, as required to provide safe navigation of the site infrastructure. Luminaires installed shall meet the maximum zonal lumen limits as specified in Section 130.2(b).

²Where greater than 50% of the paved surface of a parking lot is finished with concrete. This does not extend beyond the parking lot, and does not include any other General Hardscape areas.

³Narrow band spectrum light sources with a dominant peak wavelength greater than 580 nm – as mandated by local, state, or federal agencies to minimize the impact on local, active professional astronomy or nocturnal habitat of specific local fauna – shall be allowed a 2.0 lighting power allowance multiplier.

Figure 4: Table 140.7-A

(Figure 4). Per footnote 2 in the table, the concrete allowance can only be used for parking lot hardscape and cannot be used for other types of general hardscape.

Does exterior emergency lighting need to comply with the outdoor lighting power allowance requirements?

No. If the emergency lighting is connected to an emergency power source and is used solely for emergency egress, it does not need to meet the lighting power allowance requirements of Section 140.7.

Does exterior emergency lighting need to comply with the outdoor lighting control requirements?

No. Emergency lighting may also be exempt from the control requirements. Exception 1 to **Section 130.2(c)** provides an exemption to the control requirements for “outdoor lighting not permitted by a health or life safety statute, ordinance, or regulation to be turned OFF or reduced.” Confirm with the enforcement agency as to whether this exception applies to the project.

Nonresidential Ventilation Controls and Filtration for Alterations

Do demand control ventilation (DCV) requirements per Sections 120.1(d)3 and 4 apply to alterations and additions?

Yes, if the ventilation system is completely new or completely replaced, then DCV requirements are applicable. For alterations, the alteration must include a complete duct system replacement,

ventilation air handler replacement, and controls replacement. If any of these are not included in the alteration, DCV is not required. For an addition, if a completely new system is installed, including new ducts, new air handler, and new controls, DCV is applicable. If any of these are not included in the addition, DCV is not required.

Do the requirements for occupant sensing ventilation control (OSVC) per Section 120.1(d)5 and occupant sensing zone control (OSZC) per Section 120.2(e)3 apply to alterations and additions?

No. OSVC and OSZC requirements do not apply to alterations and additions.

Is MERV 13 filtration required for an altered space conditioning or ventilation system?

Yes. MERV 13 filtration is required when the entire space conditioning system or entire ventilation system is replaced. The alteration must include a complete duct system and air handler replacement. If either of these are not included in the alteration, MERV 13 filtration is not required. However, if filtration is added as a compliance option, a pressure drop adjustment credit can be taken for fan power allowance per **Section 141.0(b)2C** and Table 141.0-D (Figure 5).

Table 141.0-D Fan Power Limitation Pressure Drop Adjustment

Device	Adjustment Credits
Particulate Filtration Credit: MERV 9 through 12	0.5 in. of water
Particulate Filtration Credit: MERV 13 through 15	0.9 in. of water

Figure 5: Table 141.0-D

Residential Filtration for Alterations

Do the MERV 13 filtration requirements apply to low-rise residential HVAC alterations?

Yes, if the alteration to an existing system includes a new or complete replacement duct system, then MERV 13 filtration low-rise residential HVAC requirements will apply. A complete replacement of a duct system includes the replacement of at least 75 percent of the duct system.

Residential Future HPWH Dedicated Receptacle

For future installation of a heat pump water heater (HPWH), **Section 150.0(n)1A** calls for a 125 volt, 20 amp receptacle, connected to the panel with 10-gauge wire. Could 12-gauge wire be used instead, since it would suffice for 20 amp?

No. The code requires the circuit to be installed in a way that will allow for easy conversion to 240 volt operation. A typical HPWH requires 240 volt at 30 amp, so all conductor wires must be 10-gauge.

Does Section 150.0(n)1Ai specify an unterminated wire to be left in a junction box?

No. The branch circuit in Section 150.0(n)1A will have an unused conductor wire upon installation. Section 150.0(n)1Ai requires that unused conductor wire be labeled “spare,” and “electrically isolated,” or capped, on both sides (Figure 6).

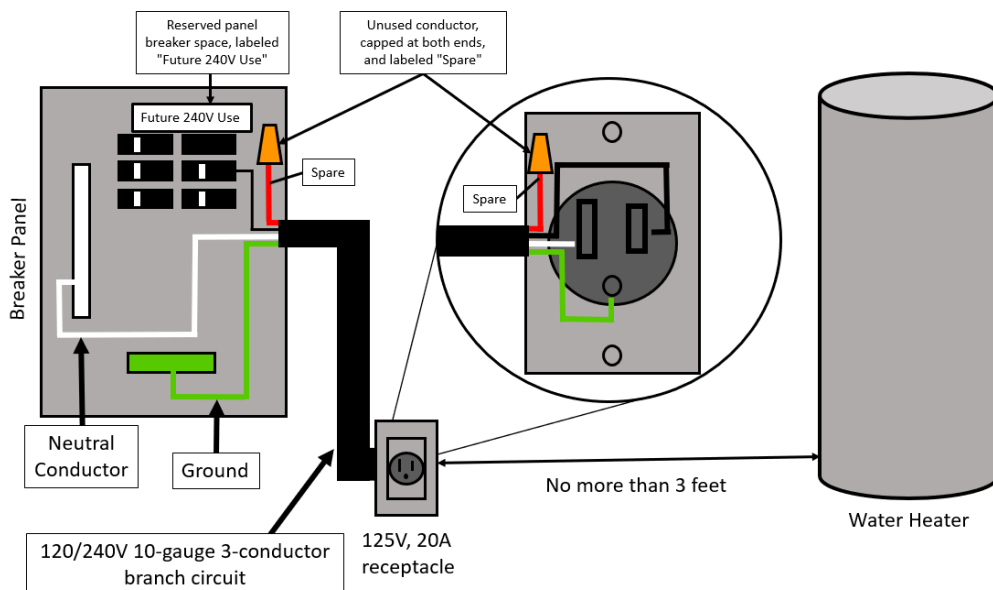


Figure 6: HPWH Ready Connections

Does single-phase (residential) power with a 2-pole breaker to supply a 240 volt circuit meet the requirements per Section 150.0(n)1Aii, which specifies a single pole breaker space for the circuit, labeled for “Future 240V Use”?

Yes. Conversion to 240 volt operation requires a 2-pole breaker. The reserved single pole circuit breaker space adjacent to the circuit breaker for the branch circuit is to be labeled with the words “Future 240V Use.”

Residential Single-Width Headers

Does a single-width header require insulation?

Yes. All exterior window and door headers shall be insulated to a minimum of R-3 for 2x4 framing, or equivalent width, and a minimum of R-5 for all other assemblies. If continuous rigid insulation equal to or greater than R-2 is used across the entire wall, an insulated header is not required.

Are uninsulated single-width headers allowed in a demising wall, such as the wall between the house and garage?

Yes. Walls between garages and conditioned spaces are only subject to mandatory requirements, which do not require continuous rigid insulation.

For 2019 Energy Code training online or on-demand see Energy Code Ace's **online offerings** for tools, training, and resources.

Residential PV Exception

Is there a PV exception for a home rebuilt after it was destroyed in a declared disaster area (such as a wildfire)?

Yes, if the home was destroyed in a declared disaster before January 1, 2020. **Assembly Bill 178** (AB 178, Dahle, Chapter 259, Statutes of 2019) provides for a PV exception which is available in the latest update to CBECC-Res residential compliance software. Additional information about how to specify this exception can be found in the software and in the CBECC-Res user manual, Section 4.4.1.2. The user manual includes a summary of the income or insurance coverage requirements specified by AB 178. The user manual can be viewed within the CBECC-Res program (select Help, then User Manual) or you can download a copy on the **2019 Approved Computer Compliance web page**. This exception expires on January 1, 2023.

Residential ADUs

I would like to build an accessory dwelling unit (ADU) directly above an existing garage. Is this new ADU considered an addition?

Yes. By adding a second story to the garage, the new ADU is still attached to the garage, and that building's conditioned floor area and conditioned volume are being increased. This is an addition.

I am converting an existing garage under 1,000 square feet to an ADU. Does this new ADU have to meet the 2019 Energy Code indoor air quality whole building ventilation requirements of Section 150.0(o)?

Yes. The 2019 Energy Code now requires whole building ventilation for any new dwelling unit, regardless of size. This requirement applies to both newly constructed ADUs, and to ADUs that are classified as additions.

Does a newly installed kitchen hood require Home Energy Rating System (HERS) verification?

Yes. All kitchen hoods installed in ADUs must have their certification, airflow, and sone rating verified by a HERS rater.

The CEC welcomes feedback on Blueprint. Please contact the editor at: Title24@energy.ca.gov.

Residential Non-HERS Compliance Forms

Are residential compliance documents always required to be registered with a HERS provider?

No. However, if HERS verification is required or modeled for compliance credit, then all residential compliance documents must be registered. Examples of residential prescriptive projects that do not require registered compliance documents include:

- Roof surface replacements
- Water heater replacements
- Window replacements
- Non-ducted wall furnace replacements

Dynamic non-HERS residential forms are available for these type of projects.

Do all residential projects require compliance documents?

No. **Section 10-103(a)1C** and **Section 10-103(a)3C** state that enforcement agencies may, at their discretion, choose not to require compliance documents for prescriptive residential alteration projects that do not require HERS verification. Prescriptive additions less than 300 square feet, which do not require HERS verification, may also be exempted from submitting compliance documents.

ENERGY
STANDARDS

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(Title 24, Part 6) questions.



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HOURS 8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

Residential Duct Testing

Are duct systems exempt from duct testing after asbestos abatement or removal or encapsulation?

No. Exception 3 to **Section 150.2(b)1E** exempts systems from duct testing if existing duct systems are constructed, insulated, or sealed with asbestos. A duct system that has been completely remediated would no longer fall within this exemption. Energy Code regulations do not specify when remediation is effective. The Energy Code defers to the authority having jurisdiction in making this determination.

More information on asbestos may be found in the California State Licensing Board's **asbestos guide for consumers**.

Camp Dwelling Occupancy

Is a dwelling associated with an organized camp under Occupancy Group C required to meet Energy Code?

No. Dwellings classified under group C would be exempt from Title 24, Part 6 requirements. However, occupancy group C is restricted to certain structures or activities associated with an organized camp. Confirm the occupancy group classification of the dwelling with the enforcement agency. All other covered occupancies listed in **Section 100.0(a)** within the organized camp would need to meet the Energy Code requirements.

FOR MORE INFORMATION

Online Resource Center (ORC):
www.energy.ca.gov/orc

Home Energy Rating System (HERS):
www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software:
<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2>

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