

## SUBCHAPTER 6

### NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES—ADDITIONS, ALTERATIONS, AND REPAIRS

#### SECTION 149 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS THAT WILL BE NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES AND TO EXISTING OUTDOOR LIGHTING FOR THESE OCCUPANCIES AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS

(a) **Additions.** Additions shall meet either Item 1 or 2 below.

1. **Prescriptive approach.** The envelope and lighting of the addition, any newly installed space-conditioning or water-heating system serving the addition, any addition to an outdoor lighting system, and any new sign installed in conjunction with an indoor or outdoor addition shall meet the applicable requirements of Sections 110 through 139 and Sections 142 through 148.
2. **Performance approach.**
  - A. The envelope and indoor lighting in the conditioned space of the addition, and any newly installed space-conditioning or water-heating system serving the addition, shall meet the applicable requirements of Sections 110 through 139; and
  - B. Either:
    - i. The addition alone shall comply with Section 141; or
    - ii. The energy use of the combination of the altered existing building plus the proposed addition shall be equal to or less than the energy use of the existing building with all alterations meeting the requirements of 149(b)2B, plus the standard energy budget of an addition that complies with Section 141.

**EXCEPTION 1 to Section 149(a):** When heating, cooling, or service water heating to an addition are provided by expanding existing systems, the existing systems and equipment need not comply with Sections 110 through 129, or Sections 144 through 145.

**EXCEPTION 2 to Section 149(a):** Where an existing system with electric reheat is expanded by adding variable air volume (VAV) boxes to serve an addition, total electric reheat capacity may be expanded so that the total capacity does; not ~~to~~ exceed 150 percent of the existing installed electric heating capacity in any one permit, and the system need not comply with Section 144(g). Additional electric reheat capacity in excess of 50 percent may be added subject to the requirements of the Section 144(g).

**EXCEPTION 3 to Section 149(a):** When ducts will be extended from an existing duct system to serve the addition, the ducts shall meet the requirements of Section 149(b)1D.

(b) **Alterations.** Alterations to existing nonresidential, high-rise residential, or hotel/motel buildings or alterations in conjunction with a change in building occupancy to a nonresidential, high-rise residential, or hotel/motel occupancy not subject to Subsection (a) shall meet either Item 1 or 2 below.

1. **Prescriptive approach.** The altered envelope, space conditioning, lighting and water heating components, and any newly installed equipment serving the alteration, shall meet the applicable requirements of Sections 110 through 139; and

**NOTE:** Replacement of parts of an existing luminaire, including installing a new ballast or new lamps, without replacing the entire luminaire is not an alteration subject to the requirements of Section 149(b)1.

- A. Alterations to the building [15dayMaz1]envelope other than those subject to 149(b)1B shall comply with the applicable subsections i through iii below:

- i. ~~For all nonresidential, high-rise residential, and hotel/motel occupancies, when fenestration is not altered there are no changes to fenestration or where there are no alterations that increase the fenestration area, non-fenestration components all altered components shall~~ meet the requirements of Section 143(a) for the altered component.~~;~~ ~~or~~

**EXCEPTION to Section 149(b)1Ai:** When either (1) less than 150 square feet of an entire building's fenestration is replaced, or (2) 50 square feet or less of fenestration area is added, compliance may be shown with Section 149(b)A(i) except that the RSGC requirement of Section 143(a)5 or the solar heat gain coefficient of 143(a)6 is not required.

- ii. ~~Nonresidential buildings shall Not~~ increase the Overall TDV Energy of the building envelope.

- iii. ~~For high-rise residential and hotel/motel buildings, alterations shall meet the requirements of Section 143(a)1 through 143(a)7.~~

**EXCEPTION 1 to Section 149(b)1Aii:** ~~For high-rise residential and hotel/motel occupancies up to 400150 square feet of added fenestration-window area may be excepted from the window-wall ratio requirements of TABLE 143-B143(a)5, and up to 50 square feet of added skylight area may be excepted from the requirements of 143(a)6A. The added fenestration-windows shall meet the RSHG requirements for the 30-40% of WWR of TABLE 143-B and added skylights shall meet the SHGC for the 2.1 to 5 percent area of TABLE 143-B.~~

**EXCEPTION 2 to Section 149(b)1Aii:** ~~When either (1) less than 150 square feet [TMM2] of an entire building's fenestration is replaced, or (2) 50 square feet or less of fenestration area is added, compliance may be shown with Section 149(b)A(i) except that the solar heat gain coefficient requirement of Section 143(a)5 is not required.~~

- B. Replacements, recovering or recoating of the exterior surface of existing nonresidential roofs shall meet the requirements of Section 118(i) and the applicable requirements of Subsection i through iv ~~below~~ where more than fifty percent of the roof or more than 2,000 square feet of roof, whichever is less, is being replaced, recovered or recoated<sup>1</sup>.
  - i. ~~Nonresidential buildings [TMM3] with low-sloped roofs in climate zones 2-15 shall have a minimum aged solar reflectance of 0.55 and a minimum thermal emittance of 0.75, or a minimum SRI of 64.~~
  - ii. ~~Nonresidential buildings with steep-sloped roofs in climate zones 2-16 with roofing product density less than five pounds per square foot shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16. Buildings with steep-sloped roofs in climate zones 1-16 with roofing product density of five pounds per square foot or more shall have a minimum aged solar reflectance of 0.15 and a minimum thermal emittance of 0.75, or a minimum SRI of 10~~
  - iii. ~~High-rise residential buildings and hotels and motels with low-sloped roofs in climate zones 10, 11, 13, 14, and 15 shall have a minimum aged solar reflectance of 0.55 and a minimum thermal emittance of 0.75, or a minimum SRI of 64.~~
  - iv. ~~When roofs are exposed to the roof deck or recover boards are exposed in nonresidential and high-rise residential buildings and hotels and motels with low-sloped roofs shall be insulated to the levels specified in Table 149-A.<sup>2</sup>~~

**EXCEPTIONS to Section 149(b)1Biv:**

1. The existing roof is insulated with at least R-~~11 [c4]-7~~ insulation or it has a U-factor lower than ~~0.075089~~.
2. ~~If mechanical equipment is located on the roof and it will not be temporarily disconnected and lifted as part of the roof replacement and if the height from the roof membrane surface to the top of the base flashing is equal to or less than 8 inches (203 mm), then additional insulation is not required. If the thickness of the insulation required in Table 149-A reduces the height of curbs to less than 4 in., the insulation thickness may be reduced to maintain a curb height above the finish roof of at least 4 in.~~

3. Tapered insulation may be used which has a thermal resistance less than that prescribed in Table 149-A at the drains and other low points, provided that the thickness of insulation is increased at the high points of the roof so that the average thermal resistance equals or exceeds the value that is specified in Table 149-A.

~~v. The building envelope, which has a roof replacement subject to this requirement, shall comply with Section 143(b), where~~

~~a. the standard building has a solar reflectance which meets the requirements of Section 143(a)1 and the other terms in Equation 143-D correspond to the existing building at the time of the application of the permit, and~~

- ~~1. the solar reflectance of the replacement roof product, as certified and labeled according to the requirements of Section 10-113 and the roof product meets the requirements of Section 118(i)3, or~~
- ~~2. a solar reflectance of 0.10 if the product has not been certified and labeled and/or does not meet the requirements of Section 118(i), and~~
- ~~3. has the other improvements to the building envelope necessary to comply.~~

**EXCEPTION [CE6]1 to Section 149(b)1B:** Roof recoverings allowed by the CBC are not required to meet Section 149(b)1B when all of the following occur:

1. The existing roof has a rock or gravel surface; and
2. The new roof has a rock or gravel surface; and
3. There is no removal of existing layers of roof coverings of more than fifty percent of the roof or more than 2,000 square feet of roof, whichever is less; and
4. There is no recoating with a liquid applied coating; and
5. There is no installation of a recover board, rigid insulation or other rigid, smooth substrate to separate and protect the new roof recovering from the existing roof.

**EXCEPTION [CE7]2 to Section 149(b)1B [C8]:** If the roofing product does not meet the requirements of Section 149(b)1B, then the Overall Envelope standard-TDV Energy Approach Budget of Section 143(b) may be used and the standard building shall be based on the higher roof/ceiling insulation value of the following:

- i. For low-sloped roofs, the insulation values specified in Table 149-A [PAYAM9];
- ii. For steep-sloped roofs, the insulation values specified in Section 143(a); or
- iii. The existing installed insulation.

~~of the overall envelope of the proposed building, TDV<sub>prop</sub>, is no greater than the total TDV Energy of the overall envelope of a standard building, TDV<sub>std</sub>, as calculated in Standards Nonresidential Appendix NA5 “Envelope Tradeoff Procedure” where the standard building shall meet all the requirements of Section 149(b)1A and 149(b)1B. [PAYAM10]~~

TABLE 149-A INSULATION REQUIREMENTS FOR ROOF ALTERATIONS

Climate Zone	Nonresidential		High-rise Residential and Guest Rooms of Hotel/Motel Buildings	
	Continuous Insulation R-value	U-factor	Continuous Insulation R-value	U-factor
1	R-8	0.081	R-14	0.055
2	R-14	0.055	R-14	0.055
3	R-8	0.081	R-14	0.055
4	R-14 <del>8</del>	0.055 <del>081</del>	R-14	0.055

**SECTION 149 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS THAT WILL BE NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES AND TO EXISTING OUTDOOR LIGHTING FOR THESE OCCUPANCIES AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGN**

5	R-8	0.081	R-14	0.055
6	R-8	0.081	R-14	0.055
7	R-8	0.081	R-14	0.055
8	R-8	0.081	R-14	0.055
9	<del>R-148</del>	<del>0.055081</del>	R-14	0.055
10	R-14	0.055	R-14	0.055
11	R-14	0.055	R-14	0.055
12	R-14	0.055	R-14	0.055
13	R-14	0.055	R-14	0.055
14	R-14	0.055	R-14	0.055
15	R-14	0.055	R-14	0.055
16	R-14	0.055	R-14	0.055

- C. New space-conditioning systems or components other than new or replacement space conditioning ducts shall meet the requirements of Section 144 applicable to the systems or components being altered; and

**EXCEPTION 1 to Section 149(b)1C:** For expansions of existing chilled water plants,<sup>3</sup> Section 144(i) applies only to expansions of more than 300 tons.

**EXCEPTION 2 to Section 149(b)1C:** For replacements of equivalent or lower capacity electric resistance space heaters for high rise residential apartment units.

**EXCEPTION 3 to Section 149(b)1C:** For replacement of electric reheat of equivalent or lower capacity electric resistance space heaters, when natural gas is not available.

- D. When new or replacement space-conditioning ducts are installed to serve an existing building, the new ducts shall meet the requirements of Section 124, and if they meet the criteria of Section 144(k)1, 2, and 3, the duct system shall be sealed and labeled as confirmed through field verification and diagnostic testing in accordance with procedures for duct sealing of existing duct systems as specified in the Reference Nonresidential Appendix NA1, to meet one of the following requirements:

- i. If the new ducts form an entirely new duct system directly connected to the air handler, the measured duct leakage shall be ~~lessno more~~ than 6% of fan flow; or
- ii. If the new ducts are an extension of an existing duct system, the combined new and existing duct system shall meet one of the following requirements:
  - a. The measured duct leakage shall be less than 15% of fan flow; or
  - b. The duct leakage shall be reduced by more than 60% relative to the leakage prior to the equipment having been replaced and a visual inspection shall demonstrate that all accessible leaks have been sealed; or
  - c. If it is not possible to meet the duct sealing requirements of Subsections a- or b-, all accessible leaks shall be sealed and verified through a visual inspection by a certified HERS rater.

**EXCEPTION to Section 149(b)1Dii:** Existing duct systems that are extended, which are constructed, insulated or sealed with asbestos.

- E. When a space conditioning system is altered by the installation or replacement of space conditioning equipment (including replacement of the air handler, outdoor condensing unit of a split system air conditioner or heat pump, cooling or heating coil, or the furnace heat exchanger):

1. Existing ~~non~~-setback thermostats shall be replaced with ~~programmable communicatingsetback~~ thermostats (PCTs) for all altered units. All newly installed space conditioning systems requiring a thermostat shall be

equipped with a ~~PCT~~setback thermostat. All ~~PCTs~~setback thermostats shall meet the requirements of Section 112(c);~~;~~ and

2. ~~T~~he duct system that is connected to the new or replaced space conditioning equipment, if the duct system meets the criteria of Section 144(k) 1, 2, and 3, shall be sealed, as confirmed through field verification and diagnostic testing in accordance with procedures for duct sealing of existing duct systems as specified in the Reference Nonresidential Appendix NA1, to one of the requirements of Section 149(b)1D;~~;~~and

**EXCEPTION 1 to Section 149(b)1E:** Buildings altered so that the duct system no longer meets the criteria of Section 144(k)-1, 2, and 3.

**EXCEPTION 2 to Section 149(b)1E:** Duct systems that are documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA1.

**EXCEPTION 3 to Section 149(b)1E:** Existing duct systems constructed, insulated or sealed with asbestos.

- F. Spaces with lighting systems installed for the first time shall meet the requirements of Sections 149(b)-1, and 143(c), 146, and 147; and
  - G. When the requirements of Section 131(c)2 are triggered by the addition of skylights to an existing building and the lighting system is not re-circuited, the daylighting control need not meet the multi-level requirements in Section 131(c)2A.
  - H. New internally and externally illuminated signs shall meet the requirements of Sections 149(b)1 and 148.
  - I. Alterations to existing indoor lighting systems shall meet the following requirements:<sup>4</sup>
    1. Alterations that increase the connected lighting load, replace, or remove and re-install a total of 50 percent or more of the luminaires in an enclosed space, shall meet the requirements of Sections 149(b)1 and 146; and<sup>5</sup>
    2. The following wiring alterations shall meet the requirements of Section 149(b)1:
      - i. Where new or moved wiring is being installed to serve added or moved ~~luminaries~~luminaires; or
      - ii. Where conductor wiring from the panel or from a light switch to the luminaires is being replaced;~~;~~ or
      - iii. Where a lighting panel is installed or moved.
    3. For an alteration where an existing enclosed space is subdivided into two or more spaces, the new enclosed spaces shall meet the requirements of Section 149(b)1; and
    4. Alterations that have less than 0.5 watts per square foot and increase the existing lighting power density to 0.5 watts per square foot or greater shall meet the requirements of Sections 149(b)1, 143(c), and 146;~~;~~ and 147; and
  - J. Alterations to existing outdoor lighting systems that for any lighting application increase the connected lighting load or replace more than 50 percent of the luminaires shall meet the requirements of Section 147; and
  - K. Alterations to existing internally and externally illuminated signs that increase the connected lighting load, replace and rewire more than 50 percent of the ballasts, or relocate the sign to a different location on the same site or on a different site shall meet the requirements of Section 148; and
- NOTE:** Replacement of parts of an existing sign, including replacing lamps, the sign face or ballasts, that do not require rewiring or that are done at a time other than when the sign is relocated, is not an alteration subject to the requirements of Section 149(b)1KJ.
- L. New service water-heating systems shall meet the requirements of Section 145.
  - M. A building shell for which interior walls or ceilings are installed for the first time shall meet the requirements of Section 143(c).

2. **Performance approach.**

- A. The altered envelope, spacing conditioning, lighting and water heating components, and any newly installed equipment serving the alteration, shall meet the applicable requirements of Sections 110 through 139; and
- B. When the altered components do not meet the requirements specified in [the Sections that are stated in](#) subsections i through viii, ~~the existing plus alteration,~~ the standard energy budget (energy budget) shall be based on the [requirements stated in those Sections as follows](#)~~following~~:<sup>6</sup>
  - i. Roof/Ceiling Insulation. The energy budget shall be based on the requirements of Tables 143-A, 143-B, [and](#) 143-C.
  - ii. Roofing Products. The energy budget shall be based on the requirements of Section 149(b)1B.
  - iii. Wall Insulation. The energy budget shall be based on the requirements of Tables 143-A, 143-B, and 143-C.
  - iv. Floor/Soffit Insulation. The energy budget shall be based on the requirements of Tables 143-A, 143-B, and 143-C.
  - v. Fenestration. The energy budget shall be based on the U-factor and SHGC value requirements of Table Tables 143-A, 143-B, and 143-C. The allowed glass area shall be the smaller of the Subsections a and b below:
    - a. The proposed glass area
    - b. The larger of:
      - 1. The existing glass area; [or](#)
      - 2. The area allowed in Section 143(a)5A.
  - vi. Space-Conditioning Equipment and Ducts. The energy budget shall be based on the requirements of Sections 149(b)1C, 149(b)1Di or Section 149(b)1Diib, and Section 149(b)1E.
  - vii. Service Water Heating Systems. The energy budget shall be based on requirements of Section 145.
  - viii. Lighting. The energy budget shall be based on the requirements of Sections 149(b)1F and 149(b)1H.
- C. When the altered components meet the requirements specified [in the Sections that are stated](#) in 149(b)2B, subsections i through viii, the standard energy budget shall be based on existing conditions.

**NOTES TO SECTION 149(b)2:**

- A. If an existing component must be replaced with a new component, that component is considered an altered component for the purpose of determining the energy budget and must meet the requirements of Section 149(b)2B.
- B. The proposed design shall be based on the actual values of the altered components.
- C. The standard design shall assume the same geometry and orientation as the proposed design.

**EXCEPTION 1 to Section 149(b):** When heating, cooling or service water heating for an alteration are provided by expanding existing systems, the existing systems and equipment need not comply with Sections 110 through 129 and Section 144 or 145.

**EXCEPTION 2 to Section 149(b):** When existing heating, cooling or service water heating systems or components are moved within a building, the existing systems or components need not comply with Sections 110 through 129 and Section 144 or 145.

**EXCEPTION 3 to Section 149(b):** Where an existing system with electric reheat is expanded when adding variable air volume (VAV) boxes to serve an alteration, total electric reheat capacity may be expanded not to exceed 20 percent of the existing installed electric capacity in any one permit and the system need not comply with Section

144(g). Additional electric reheat capacity in excess of 20 percent may be added subject to the requirements of the Section 144(g).

**NOTE:** Relocation or moving of a relocatable public school building is not considered an alteration for the purposes of complying with Title 24, Part 6. If an alteration is made to envelope, space conditioning, lighting or water heating components of a relocatable public school building, the alteration is subject to Section 149(b). ~~A relocatable public school building, for which an application for approval of original construction or for approval of alteration to the building envelope, space conditioning, lighting or water heating components of the relocatable building is submitted after the effective date of the 2004 California Energy Code, is subject to Section 143(a)8.~~

- (c) **Repairs.** Repairs shall not increase the preexisting energy consumption of the repaired component, system, or equipment.
- (d) **Alternate Method of Compliance.** Any addition, alteration, or repair may comply with the requirements of Title 24, Part 6 by meeting the applicable requirements for the entire building.

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<sup>1</sup> Requires clarification on wording; For roofs as an example for a total 1000 ft<sup>2</sup> roof where 50% plus is being reroofed, which part of the Section 149(b)1B.

<sup>2</sup> Insulation requirements for roof alterations were revised to address comments received at the June 13, 2007 public workshop.

<sup>3</sup> Edited for clarity.

<sup>4</sup> Edited for clarity. Some of the language has been taken from the 2005 Nonresidential Compliance Manual. A staff analysis will support requiring compliance when 50% or more of the luminaires are moved.

<sup>5</sup> The reference to Section 132 has been removed because it refers to outdoor lighting controls only, and is incorrect to list here.

<sup>6</sup> Edited for clarification of existing Standards.