

## Errata 1 changes to the 2019 Nonresidential Compliance Manual

*This errata addresses twenty suggested revisions to the 2019 Nonresidential Compliance Manual (NRCM) along with minor changes to correct grammatical errors, clarify meaning, or generally clean up otherwise confusing language. Page numbers refer to the [2019 Nonresidential Compliance Manual](https://ww2.energy.ca.gov/publications/displayOneReport_cms.php?pubNum=CEC-400-2018-018-CMF) posted at [https://ww2.energy.ca.gov/publications/displayOneReport\\_cms.php?pubNum=CEC-400-2018-018-CMF](https://ww2.energy.ca.gov/publications/displayOneReport_cms.php?pubNum=CEC-400-2018-018-CMF). The text below shows changes in underline-strikeout. Added text is shown in underline; ~~deleted text shown in strikeout~~. This change document is not comprehensive and does not provide all of the minor changes (such as typos and formatting corrections) made that do not alter the meaning of the NRCM. The revised NRCM contains vertical change bars in the margins of each page to indicate a location where the manual has been altered.*

### Chapter 1, p. 1-4

#### 1.5.3 Mechanical

1. Healthcare buildings overseen by the California Office of Statewide Health Planning and Development (OSHPD) shall comply with the Energy Standards. However, there are exemptions for healthcare facilities to avoid conflicting requirements.
2. New mandatory requirements for demand response HVAC controls (§110.12[a] and §110.12[b]).
3. New mandatory requirements for ventilation and indoor air quality (§120.1).
4. Revision of the mandatory requirements for demand control ventilation (§120.1[d]).
5. Revision of the requirements for occupancy--sensing zone controls (§120.2[e]3).
6. Revision of the mandatory requirements for economizer fault detection and diagnostics (§120.2[i] and §140.9[a]1A).
7. New mandatory requirements for adiabatic condensers (§120.6).
8. Revision of the prescriptive requirements for fan power limitation (§140.4[c]).
9. New prescriptive requirements for space--conditioning zone controls (§140.4[d]).
10. New prescriptive requirements for water economizers (§140.4[e]3).
11. New prescriptive requirements for cooling tower efficiency (§140.4[h]5).
12. New prescriptive requirements for exhaust system transfer air (§140.4[o]).
4. ~~New prescriptive requirements for laboratory and factory exhaust systems (§140.9[c]). Revision of the mandatory requirements for equipment efficiency in Tables 110.2-A through 110.2-K of the Energy Standards.~~
2. ~~Interlock controls requirements when operable wall or roof openings are present (§140.4(n)).~~
3. ~~Revisions to fan control system requirements in Table 140.4-D of the Energy Standards.~~
4. ~~Energy Management Control System (EMCS) to comply with the thermostatic control requirements (§120.2(a)).~~
5. ~~Changes to the requirements for dampers installed on outdoor air supply and exhaust equipment (§120.2(f)).~~
6. ~~New section specifying direct digital controls (DDC) applications and qualifications (§120.2(j)).~~

~~7. Revisions to the requirements for space conditioning systems with DDC to the zone level (§120.2(k)).~~

~~8.13. New general requirements for pipe insulation (§120.3(a)).~~

### **Chapter 1, p. 1-23**

Example 1-17

#### **Question**

Does a LEED-certified building still need to meet the ~~2016-2019~~ Energy Standards?

#### **Answer**

Yes.

### **Chapter 3, p. 3-6**

All joints and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, weather stripped, or otherwise sealed to limit air leakage. This sealing applies to penetrations for pipes and conduits, ducts, vents, and other openings. All gaps between wall panels, around doors, and other construction joints must be well sealed. Ceiling joints, lighting fixtures, plumbing openings, doors, and windows should all be considered as potential sources of unnecessary energy loss due to infiltration.

~~No special construction requirements are necessary for suspended (T-bar) ceilings, provided they meet the requirements of §110.8(e).~~

### **Chapter 3, p. 3-7**

**Table 3-1: Materials Deemed to Comply as Air Barrier**

<b>MATERIALS AND THICKNESS</b>
Plywood – min. 3/8 inches thickness
Oriented strand board – min. 3/8 inches thickness
Extruded polystyrene insulation board – min. ½ inches thickness
Foil-back polyisocyanurate insulation board – min. ½ inches thickness
Closed-cell spray foam with a minimum density of 2.0 pcf and a min. 1½ inches thickness
Open cell spray foam with a density no less than 0.4 pcf and no greater than 1.5 pcf, and a min. 5½ inches thickness
Exterior or interior gypsum board- min. ½ inches thickness
Cement board – min. ½ inches thickness
Built-up roofing membrane
Modified bituminous roof membrane
Fully adhered single-ply roof membrane
A Portland cement or Portland sand parge, or a gypsum plaster, each with min. 5/8 inches thickness
Cast-in-place concrete, or precast concrete
Fully grouted concrete block masonry
Sheet steel or sheet aluminum

**Chapter 3, p. 3-13**

**Updated and reformatted the table**

**Table 3-3: Prescriptive Criteria for Roofing Products for High-Rise Residential Buildings and Guest Rooms of Hotel/Motel Buildings**

<u>Climate Zone (CZ)</u>	<u>Low-sloped Aged Reflectance</u>	<u>Low-sloped Emittance</u>	<u>Low-sloped SRI</u>	<u>Steep-Sloped Aged Reflectance</u>	<u>Steep-Sloped Emittance</u>	<u>Steep-Sloped SRI</u>
<u>CZ 1</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>16</u>
<u>CZ 2</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 3</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 4</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 5</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 6</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 7</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>

<u>CZ 8</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 9</u>	<u>0.55</u>	<u>0.75</u>	<u>64</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 10</u>	<u>0.55</u>	<u>0.75</u>	<u>64</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 11</u>	<u>0.55</u>	<u>0.75</u>	<u>64</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 12</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 13</u>	<u>0.55</u>	<u>0.75</u>	<u>64</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 14</u>	<u>0.55</u>	<u>0.75</u>	<u>64</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 15</u>	<u>0.55</u>	<u>0.75</u>	<u>64</u>	<u>0.2</u>	<u>0.75</u>	<u>16</u>
<u>CZ 16</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>16</u>

*Energy Standards Table 140.3-C*

**Chapter 3, p. 3-69**

In these cases, the project may instead demonstrate to the enforcement agency that the fenestration is shaded for less than a certain number of daytime hours between 8 a.m. and 5 p.m. For the PAF, the minimum number of shaded hours is 500. Section 3.3.3-24.2Q-2G shows ~~an example of~~ how to demonstrate shaded hours.

**Chapter 4, p. various**

**Many of the section headings throughout this chapter were incorrect and have been updated.**

**Chapter 4, p. 4-28**

Attached dwelling units in high-rise residential buildings are subject to the requirements of §120.1(b) while all other occupied spaces in a high-rise residential building are subject to the requirements of §120.1(c). The requirements of §120.1(b)2 are based on ASHRAE Standard 62.2, "Ventilation and Acceptable Indoor Air Quality in Residential Buildings" with certain amendments. A copy of the California Energy Commission-adopted relevant version of ASHRAE Standard 62.2-2016 may be obtained at the following URL:

<https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2>

**Chapter 4, p. 4-31**

Energy Standards Section 120.1(b)1D requires all systems to be designed to accommodate the clean-filter pressure drop imposed by the system air filter device(s). This applies to space conditioning systems and ~~to~~ the ventilation system types described in Sections 4.3.1.1 and 4.3.1.2 above. A designer or installer must determine the design airflow rate and maximum allowable clean-filter pressure drop. It must then be posted by the installer on a sticker or label inside the filter grille or near the filter rack, according to Section 4.3.1.3.2 below.

**Chapter 4, p. 4-32**

- b. **Air filter manufacturer label.** Space conditioning system filters are required to be labelled by the manufacturer to indicate the pressure drop across the filter at several airflow rates. The manufacturer's air filter label (see Figure 4-3) must display information that indicates the filter can meet the design airflow rate for that return grille/rack at a pressure drop less than or equal to the value shown on the installer's air filter grille sticker.

**Chapter 4, p. 4-40**

Use of central ventilation fans/shafts that are shared with multiple dwelling units in the building are more common in mid-rise and high-rise buildings. When a supply or exhaust system provides dwelling unit ventilation to more than one dwelling unit, the airflows in each dwelling unit must be equal to or greater than the required (minimum) ventilation rate, and the airflows for each dwelling unit must ~~also~~ be balanced to be no more than 20 percent greater than the specified rate. (See

Energy Standards Section 120.1([b])2Av).

#### **Chapter 4, p. 4-43**

*From Energy Standards Section 150.0(o)1: Compliance with ASHRAE 62.2 Section 4.4 (Control and Operation) shall require manual switches associated with dwelling unit ventilation systems to have a label clearly displaying the following text, or equivalent text: "This switch controls the indoor air quality ventilation for the home. Leave it on unless the outdoor air quality is very poor."*

#### **Chapter 5, p. 5-13**

The manual on and off lighting controls shall meet all of the following requirements:

1. Be readily accessible.  
EXCEPTION: Public restrooms having two or more stalls, parking areas, stairwells, and corridors may use a manual control not accessible to unauthorized personnel.
2. Be located in the same room or area as the lighting that is being controlled by that controller enclosed area with the lighting it controls.

#### **Chapter 5, p. 5-27**

For luminaires in skylit daylit zones and primary sidelit daylit zones, automatic daylighting controls must be installed and configured to operate according to all of the following requirements:

1. ~~When photosensors are located within the daylit zone, at least one p~~Photosensors shall be located so ~~it is~~they are not readily accessible to unauthorized personnel. The location where calibration adjustments are made to automatic daylighting controls shall be readily accessible to authorized personnel and may be inside a locked case or under a cover ~~that~~which requires a tool for access. Access to controls can be limited by placing locks or screws on enclosures or under a cover plate so a tool or key is needed to gain access. Though not required, commissioning and retro-commissioning of the control is simplified if the calibration adjustments are readily accessible to authorized personnel so that a lift or a ladder is not required to access the location where calibration adjustment are made.

Some controls have wireless remotes for adjusting settings. This convenience allows one person with a light meter and the wireless calibration tool to be located at the edge of the daylit zone and make the calibration adjustments without having to run back and forth between taking the measurement and making the adjustment

2. Automatic daylighting controls must provide functional multi-level lighting levels having at least the number of control steps specified in Table 5-1 (Table 130.1-A of the Energy Standards).

~~EXCEPTION: Multi-level lighting controls are not required if the controlled lighting has a lighting power density less than 0.3 W/ft<sup>2</sup>.~~

Note that when the requirements of §130.1(d) are triggered by the addition of skylights to an existing building and the lighting system is not re-circuited, the daylighting control is not required to meet the multi-level requirements in §130.1(d). This is in accordance with §141.0(b)2G for alterations.

3. For each space, the combined illuminance from the controlled lighting and daylight shall not be less than the illuminance from controlled lighting when no daylight is available. In the darkest portion of the daylit zone (furthest away from windows or skylights) the control should not over-dim the lights; this portion of the daylit area should not get darker as daylight levels increase, due to incorrect calibration of the controls.

4. In areas served by lighting that is daylight controlled, and that daylight illuminance is greater than 150 percent of the design illuminance received from the general lighting system at full power, the general lighting power in that daylight zone shall be reduced by a minimum of 65 percent.

The best control would fully dim the system when daylight levels in the darkest portion of the daylight zone are at 100 percent of design illuminance, but the 150 percent /65 percent requirement allows some tolerance for error while obtaining most of the energy savings.

EXCEPTIONS: Automatic daylighting controls are not required for any of the following conditions:

- Areas under skylights where it is documented that existing adjacent structures or natural objects block direct sunlight for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
- Areas adjacent to vertical glazing below an overhang, where the overhang covers the entire width of the vertical glazing, no vertical glazing is above the overhang, and the ratio of the overhang projection to the overhang rise is greater than 1.5 for south, east and west orientations or greater than 1 for north orientations.
- Rooms in which the combined total installed general lighting power in the skylit daylight zone and primary sidelit daylight zone is less than 120 watts.
- Rooms which have a total glazing area of less than 24 square feet.
- Parking garages complying with §130.1(d)3.
- Luminaires in sidelit daylight zones in retail merchandise sales and wholesale showroom areas.

### **Chapter 5, p. 5-30**

In indoor spaces, there can be more than one type of lighting control installed in the space to meet the Energy Code requirements effor lighting controls. In the 2019 standards, ~~a new section~~, Section 130.1(f) has been added to clarify interactions between two lighting control types.

### **Chapter 5, p. 5-70**

Acceptance testing must be performed by a certified lighting controls acceptance test technician, to certify the, indoor and outdoor lighting controls serving the building, area, or site willfor meeting the acceptance requirements.

### **Chapter 5, p. 5-73**

The 2019 edition of Title 24, Part 6 restructured the lighting alterations language to improve clarity. The three previous types of lighting alterations (entire luminaire, luminaire component, and wiring) have been unified into a single section (Section 141.0(b)2I), and the three compliance options have been clearly stated.

Alterations to the lighting systems must comply with the requirements in Section 141.0(b)2I when 10 percent or more of the luminaires serving an enclosed space are altered. ~~Three types of alterations are covered by the standard:~~

- ~~1. Entire luminaire alterations affect the entire luminaire such as the complete replacement of old luminaires with new.~~
- ~~2. Completely disconnecting the luminaire from the circuit, modifying it, and reinstalling it.~~
- ~~3. Moving or modifying the walls or ceilings of the space along with modifying the space's lighting system.~~

~~Luminaire component modifications include replacing the ballasts or drivers and the associated lamps in the luminaire, permanently changing the light source of the luminaire, or changing the optical system of the luminaire. Wiring alterations add a circuit feeding luminaires; replace, modify, or relocate wiring between a switch or panel board and luminaires; or replace lighting control panels, panel boards, or branch circuit wiring.~~

### Chapter 5, p. 5-76

#### Example 5-26 Tenant Space Luminaire Lighting Alterations

~~All 100 light fixtures are being removed and replaced in one an enclosed room of a commercial tenant space of less than 5,000 sq. ft. The entire tenant space has a total of 100 light fixtures. The altered room will receive a total of 40 new light fixtures will be installed in the altered-lighting room.~~ Which Energy Standards requirements must the project we comply with?

#### Answer

Since all existing luminaires (fixtures) within the enclosed area (room) are being replaced with 40 new ones, the project must comply with one of the two requirements of i, or ii of §141.0(b)2I. Since this is not a one-for-one alteration, section iii of §141.0(b)2I is not available as an option for compliance.

### Chapter 5, p. 5-77

#### Example 0-27 Example Warehouse Lighting Luminaire Alteration (example compliance With the 40 Percent Lighting Power Reduction option)

#### Question

~~The All existing metal halide luminaires in a warehouse facility of 5,000 sq. ft. are proposed to be replaced by LED luminaires (shown below). There are 100 existing metal halide luminaires that and each uses 250 watts, each, all of which will be replaced. The replacement LED luminaires use 150 watts each. How is compliance being determined under the new power reduction option, and what controls are required?~~

#### Answer

~~The power reduction compliance option of §141.0(b)2Iiii requires a 40 percent reduction in installed lighting power for one-to-one luminaire alterations within a building or tenant space of 5,000 square feet or less. Thus, enter the number and wattage of the existing luminaires into NRCC-LTI, and use the form to calculate both the existing installed lighting power (100 x 250 = 25,000) and the maximum allowance based on a 40 percent reduction (25,000 x 0.6 = 15,000). Enter the number and wattage of the new luminaires into NRCC-LTI, just like any other project; if This is a one-for-one replacement, so then the total lighting power of the new luminaires would be at the allowance (100 x 150 = 15,000).~~

~~Since the alteration meets §141.0(b)2Iiii lighting power reduction is at 40 percent, only manual area controls and automatic shutoff controls are mandatory as specified in Table 141.0-F (Table 5-2 in this manual) Section 141.0(b)2Iii and summarized in Table 5-4.~~

### Chapter 5, p. 5-77

#### Example 0-28 Lighting Wiring Projects

#### Question

If the lighting system is being rewired as part of a lighting alteration project, which Energy Standards requirements must be complied with?

## Answer

~~Note that a~~ Alterations to lighting wiring are considered alterations to the lighting system, so; the requirements for wiring alterations and lighting alterations are the same as for the lighting system alterations.

~~New or completely replaced~~ Altered lighting circuits When the alteration involves a wiring alteration, it must comply with the control separation requirements as specified in §130.1(a)3 and 130.1(c)1D.

The acceptance testing requirements are triggered if controls are added to control more than 20 luminaires.

### Chapter 5, p. 5-78

#### Example 0-29 Alterations PProjects with RReplacing Both Lamps and Ballasts of the Luminaire ~~being replaced~~s

##### Question

There are 100 lighting fixtures in an existing office space. For 20 fixtures, the internal components (lamps and ballasts) are being replaced with new kits.

Which Energy Standards requirements apply?

##### Answer

Because 20 out of 100, (or 20 percent) ~~(more than 10 percent of the trigger threshold)~~, of the luminaires are altered which is more than the 10 percent threshold to trigger that the alteration meet either §141.0(b)2li or §141.0(b)2lii requirements. Moreover Additionally, removing and replacing both lamps and ballasts with retrofit kits are considered one-for-one luminaire alterations. Therefore, the alteration could meet §141.0(b)2liii instead of §141.0(b)2li or §141.0(b)2lii if the total wattage of the altered luminaires has been reduced by at least 40 percent% and if the altered building or tenant space is 5,000 square feet or less ~~and also both lamps and ballast are replaced (removed and replaced with retrofit kits), the alteration shall meet one of the requirements of i, ii, or iii of Section 141.0(b)2I, "Altered Indoor Lighting Systems".~~

### Chapter 5, p. 5-78

#### Example 0-30 One-for-One AAlterations in Enclosed Spaces With One Luminaire

##### Question

A project includes more than 50 luminaires with one-for-one alterations u on a floor, but a portion of those altered luminaires are in enclosed spaces containing one luminaire.

How are the luminaires in the enclosed spaces counted toward the trigger threshold of 50 luminaires under §141.0(b)2I in a (one-for-one luminaire alteration)?

##### Answer

~~Although~~ Yes, the Exception 2 to §141.0(b)2I exempts enclosed spaces with one luminaire from the requirements of Section 141.0(b)2I, it but does not reduce the total luminaire count on a floor or a tenant space. Therefore, the altered luminaires on the floor that are not in other than those the one-luminaire spaces are required to meet one of the three requirements of either i, ii, or iii of Section §141.0(b)2li, §141.0(b)2lii, or §141.0(b)2liii.

### Chapter 6, p. 6-14



## 1. Requirements of for Outdoor Lighting Controls

§130.2(c)

The primary requirements for outdoor lighting controls are as follows:

### Chapter 6, p. 6-17

The motion sensing controls shall:

1. Be capable of reducing~~reduce~~ the lighting power of each luminaire by at least 50 percent and no more than 90 percent, and separately~~or~~ be capable of turning the luminaire off during unoccupied periods.
2. Be capable of reducing the lighting to the~~its~~ dim or off state within 15 minutes of vacancy detection and turning the lighting back on upon occupancy.
3. Control no more than 1,500 watts of lighting power by a single sensor.

### Chapter 9, p. 9-6

Exception 2: A solar hot water system (SWH) is permanently installed on high-rise multifamily or, hotel/motel, ~~and nonresidential buildings~~. The SWH system must comply with §150.1(c)8Biii, the prescriptive solar requirements for a system serving multiple dwelling units. To verify compliance with this exception, submit NRCI-STH-01-E Certificate of Installation: Solar Water Heating System.

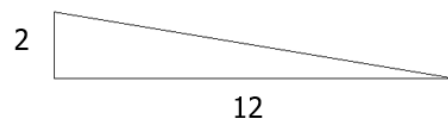
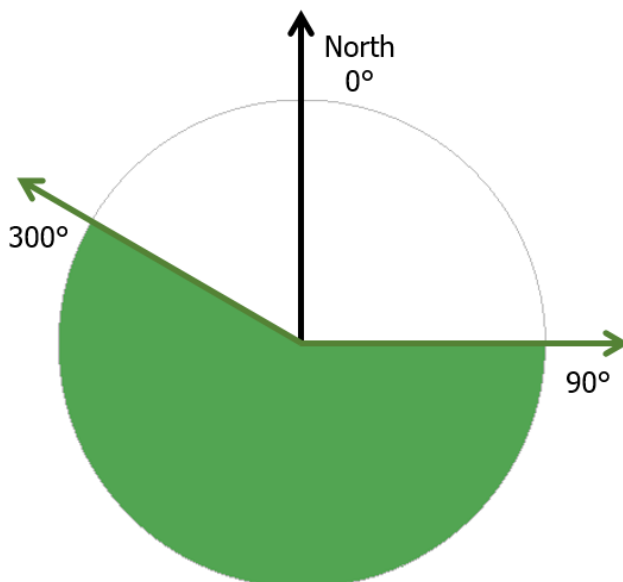
### Chapter 9, p. 9-7

If the solar zone is ~~located~~ on a steep-sloped roofs (the roof has a rise to run ratio of greater than 2:12), then the roof must be oriented between ~~90-140~~ degrees and ~~300-270~~ degrees of true north (not magnetic north). The orientation is important because it ensures a reasonable solar exposure if a solar energy system is installed in the future.

### Chapter 9, p. 9-8

#### Updated the figure

Figure 9-1: Orientation of Roof If Solar Zone Is Located on Steep-Sloped Roof



If solar zone is located on a sloped roof with a rise to run ratio greater than 2:12 (see above), then the roof must face between 90° and 300°

§120.8(d)

1. Design reviewer requirements are based on the project size and complexity of the mechanical systems, as follows:
  - a. For newly constructed buildings less than 10,000 square feet, design phase review may be completed by the ~~design engineer or architect of record~~.
  - b. ~~For newly constructed buildings between 10,000 and 50,000 square feet, it may be completed by a qualified in-house engineer or architect with no other project involvement or a third party engineer, architect, or contractor either an in-house engineer to the design firm but not associated with the building project, or a third party design engineer.~~
  - c. For newly constructed buildings larger than 50,000 square feet or buildings with complex mechanical systems, an independent review by a third-party engineer, architect, or contractor ~~a third party design engineer~~ is required.

**Chapter 12, p. 12-8**

**A. Design Review Kickoff - Initial Schematic Review**

1. ~~An in-person~~ meeting is held between the project owner (or owner's representative), design team representatives (including mechanical and electrical design engineers, project architect), commissioning coordinator, and design reviewer.