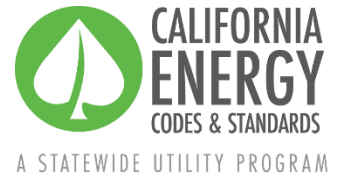


Proposal Summary



2022 California Energy Code (Title 24, Part 6)

Single Family Passive House Prescriptive Path

Date last updated: October 25, 2019

Prepared by: Bill Dakin

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on November 12, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by December 5, 2019.

Measure Description

The purpose of this measure is to investigate and develop an alternative prescriptive compliance path for homes certified by Passive House (PH). The California Energy Commission and the Title 24, Part 6 Standards embrace many of the goals behind the Passive House Standard. That means optimized envelopes utilizing smaller heating, cooling and generation systems, and minimizing building energy use.

The guiding principles behind the PH Standard and Certification embrace the ongoing goals and intent of Title 24, Part 6. The intent of this research measure is to determine if buildings built to the PH Standard could potentially satisfy requirements under the 2022 California Energy Code, and could buildings certified under the PH Standard qualify as equivalent to the prescriptive requirements for residential buildings.

The Statewide CASE Team will investigate whether any barriers or challenges exist to ensure enforceability, identify whether a home built to the Passive House Standard can meet the prescriptive code requirements, what, if any, measures may be required to meet equivalency, and review key elements in Passive House that are not adequately addressed in the ACM.

While PH certified projects can comply with Title 24, Part 6 using the performance approach, providing a prescriptive compliance path for PH certified projects can allow for higher adoption in both single family and multifamily construction, which can further reduce energy use in buildings resulting in significant energy savings and greenhouse gas (GHG) reductions.

Draft Code Language

The proposed changes under consideration for the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions).



Standards

Section 150.1 - Performance and Prescriptive Compliance Approaches For Low-Rise Residential Buildings

(a) **Basic Requirements.** Low-rise residential buildings shall meet all of the following:

1. The applicable requirements of Sections 110.0 through 110.10.
2. The applicable requirements of Section 150.0 (mandatory features).
3. Either the performance standards or the prescriptive standards set forth in this section for the Climate Zone in which the building is located. Climate zones are shown in Reference Joint Appendix JA2 – Weather/Climate Data.

EXCEPTION 1 to Section 150.1(a)3: If a single contiguous subdivision or tract falls in more than one Climate Zone, all buildings in the subdivision or tract may be designed to meet the performance or prescriptive standards for the Climate Zone that contains 50 percent or more of the dwelling units.

NOTE: The Commission periodically updates, publishes, and makes available to interested persons and local enforcement agencies precise descriptions of the Climate Zones, as specified in Reference Joint Appendix JA2 – Weather/Climate Data.

EXCEPTION 2 to Section 150.1(a)3: A building complies if it meets the Passive House performance criteria using Passive House Institute (“PHI”) or Passive House Institute US (“PHIUS”) Approved Software. Buildings meeting compliance with Passive House certification shall also meet the requirements of the following prescriptive sections:

- Section 150.1(c)1B – Walls in Climate Zone 8 only
- Section 150.1(c)1E – Field Verification of Quality Insulation Installation (QII)
- Section 150.1(c)3A – Fenestration U-factor and SHGC requirements. SHGC requirements can be met with exterior shading per Section 150.1(c)4.
- Section 150.1(c)6 and Section 150.1(c)7 - Space Heating and Cooling Systems
- Section 150.1(c)8 – Domestic Water-Heating Systems
- Section 150.1(c)9B – Space Conditioning Distribution Systems, Ducts and air handlers located in conditioned space
- Section 150.1(c)14 – Photovoltaic Requirements

Reference Appendices

Alternative Calculation Method Reference Manual

N/A

Proposal Summary



2022 California Energy Code (Title 24, Part 6)

Single Family Energy Savings and Process Improvements for Additions and Alterations – Submeasure A: Prescriptive Changes

Updated: Thursday, November 7, 2019

Prepared by: Alea German, Frontier Energy

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on November 12, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by December 5, 2019.

Measure Description

This submeasure will identify opportunities for efficiency improvements by expanding existing requirements where appropriate. The following specific proposals will be considered.

- Expand the current prescriptive cool roof requirement for steep-slope roof alterations to Climate Zones 8 and 9.
- Expand the current prescriptive cool roof requirement for low-slope roof alterations to Climate Zones 8 through 12 and 14.
- Add a requirement in Climate Zones 2, 4, and 8 through 16 for R-49 attic insulation at time of steep-slope roof replacement.
- Add a requirement in Climate Zones 2, 4, and 8 through 16 for R-14 above deck continuous insulation at time of low-slope roof replacement.
- Add prescriptive requirement for R-49 attic insulation for altered ceilings in Climate Zones 2, 4, and 8 through 16.
- Increase prescriptive requirement for attic insulation in additions ≤ 700 square feet to R-38 from R-30 in Climate Zones 2, 4, and 8 through 10.
- Prohibit electric resistance heating replacement systems when the existing system is an electric furnace with central air conditioning.
- Prohibit electric resistance water heating replacement systems unless the existing system is an electric resistance water heater located within conditioned space or in an exterior closet.
- Increase prescriptive requirement for duct insulation for new ducts in an alteration to R-8 from R-6 in Climate Zones 1, 2, 4, 8 through 10, and 12 through 13.
- Reduce or remove the exception for duct sealing requirements when 40 feet or less of new or replacement ductwork is installed.



Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions). Expected sections or tables of the proposed code (but not specific changes at this time) are highlighted in yellow.

Standards

SECTION 110.8 – MANDATORY REQUIREMENTS FOR INSULATION, ROOFING PRODUCTS AND RADIANT BARRIERS

(d) **Installation of Insulation in Existing Buildings.** Insulation installed in an existing attic, or on an existing duct or water heater, shall comply with the applicable requirements of Subsections 1, 2, and 3 below. If a contractor installs the insulation, the contractor shall certify to the customer, in writing, that the insulation meets the applicable requirements of Subsections 1, 2, and 3 below.

1. **Attics.** If insulation is installed in the existing attic of a low-rise residential building, the R-value of the total amount of insulation (after addition of insulation to the amount, if any, already in the attic) shall meet the requirements of Section ~~150.0(a)~~150.2(b)1.

EXCEPTION to Section 110.8(d)1: Where the accessible space in the attic is not large enough to accommodate the required R-value, the entire accessible space shall be filled with insulation provided such installation does not violate Section 1203.2 of Title 24, Part 2.

SECTION 150.2 – ENERGY EFFICIENCY STANDARDS FOR ADDITIONS AND ALTERATIONS TO EXISTING LOW-RISE RESIDENTIAL BUILDINGS

(a) **Additions.** Additions to existing low-rise residential buildings shall meet the requirements of Sections 110.0 through 110.9, Sections 150.0(a) through (q), and either Section 150.2(a)1 or 2.

1. **Prescriptive approach.** Additions to existing buildings shall meet the following additional requirements:

B. Additions that are 700 square feet or less shall meet the requirements of Section 150.1(c), with the following modifications:

- i. ~~Roof and~~ Ceiling insulation shall be installed in an ventilated attic with an R-value equal to or greater than shall be insulated to R38 in climate zones 1, 2, 4, 8~~11~~-16 or R-30 in climate zones 3, 5-7~~2-10~~ located between the attic and the conditioned space; and

(b) **Alterations.** Alterations to existing low-rise residential buildings or alterations in conjunction with a change in building occupancy to a low-rise residential occupancy shall meet either Item 1 or 2 below.

1. **Prescriptive approach.** The altered component and any newly installed equipment serving the alteration shall meet the applicable requirements of Sections 110.0 through 110.9 and all applicable requirements of Section 150.0(a) through (l); 150.0(m)1 through 150.0 (m)10, Section 150.0(o) through (q); and

A. **Ceiling Insulation.** Vented attics in Climate Zones 2, 4, and 8 through 16 shall be insulated to achieve a weighted U-factor of 0.020 or insulation shall be installed at the ceiling level resulting in an installed thermal resistance of R-49 or greater for the insulation alone. Where ceiling insulation is added to an existing vented attic, attic ventilation shall comply with CBC requirements.

EXCEPTION 1 to Section 150.2(b)1Ai: Buildings with at least R-38 existing insulation installed at the ceiling level.

EXCEPTION 2 to Section 150.2(b)1Ai: Buildings without attic access to the attic area.

EXCEPTION 3 to Section 150.2(b)1Ai: Buildings where the alteration that would directly cause the disturbance of asbestos, unless the alteration is made in conjunction with asbestos abatement.

EXCEPTION 4 to Section 150.2(b)1Ai: Buildings with knob and tube wiring located in the vented attic.

EXCEPTION 5 to Section 150.2(b)1Ai: Attics with limited vertical height that do not allow the installation of R-49 may install a lower R-value that maximizes the depth while still meeting code requirements including required air gaps.

- D. **Altered Duct Systems - Duct Sealing:** In all Climate Zones, when more than ~~XXX~~40 feet of new or replacement space-conditioning system ducts are installed, the ducts shall comply with the applicable requirements of subsections i and ii below. Additionally, when altered ducts, air-handling units, cooling or heating coils, or plenums are located in garage spaces, the system shall comply with subsection 150.2(b)1Diic regardless of the length of any new or replacement space-conditioning ducts installed in the garage space.
- i. New ducts located in unconditioned space shall meet the applicable requirements of Sections 150.0(m)1 through 150.0(m)11, and the duct insulation requirements of TABLE 150.2-A, and

TABLE 150.2-A DUCT INSULATION R-VALUE

Climate Zone	3, 5 through 7+ through 10, +12&+13	1, 2, 4, 8 through 16+1, +4 through +6
Duct R-Value	R-6	R-8

- G. **Altered Space-Conditioning System.** ~~Altered or r~~Replacement space-conditioning systems shall meet one of the following~~be limited to natural gas, liquefied petroleum gas, or the existing fuel type.~~

- i. A natural gas or propane heating system; or
- ii. A heat pump.

EXCEPTION to Section 150.2(b)1G: If the heating system is a non-ducted system or is a ducted system without central air conditioning, an electric resistance heating system is allowed.

EXCEPTION to Section 150.2(b)1G: When the fuel type of the replaced heating system was natural gas or liquefied petroleum gas, the replacement space conditioning system may be a heat pump

- H. **Water-Heating System.** Altered or replacement service water-heating systems or components shall meet the applicable requirements below:

iii. **Water heating system.** The water heating system shall meet one of the following:

- a. A natural gas or propane water-heating system; or
- b. For Climate Zones 1 through 15, a single heat pump water heater. The storage tank shall not be located outdoors and be placed on an incompressible, rigid insulated surface with a minimum thermal resistance of R-10. The water heater shall be installed with a communication interface that meets either the requirements of 110.12(a); or
- c. For Climate Zones 1 through 15, a single heat pump water heater that meets the requirements of NEEA Advanced Water Heater Specification Tier 3 or higher. The storage tank shall not be located outdoors; or
- d. If no natural gas is connected to the existing water heater location, one of the following:~~a consumer electric water heater~~
- i. A single heat pump water heater; or
- ii. A consumer electric water heater if the water heater is located within conditioned space or in an exterior closet; or
- iii. A solar water-heating system meeting the installation criteria specified in Reference Residential Appendix RA4.20 and with a minimum solar savings fraction of XXX (value to be determined); or
- iv. A solar photovoltaic with a minimum capacity of XXX (value to be determined); or
- v. Grid interactive electric water heater (specs to be determined).

I. **Roofs.** Replacements of the exterior surface of existing roofs, including adding a new surface layer on top of the existing exterior surface, shall meet the requirements of Section 110.8 and the applicable requirements of Subsections i and ii where more than 50 percent of the roof is being replaced.

i. Low-rise residential buildings with steep-sloped roofs shall meet the following:

a. New roofing products in Climate Zones ~~8~~⁴ through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.

EXCEPTION TO 150.2(b)1Iia: The following shall be considered equivalent to Subsection i:

~~a. Air space of 1.0 inch (25 mm) is provided between the top of the roof deck to the bottom of the roofing product; or~~

~~b. The installed roofing product has a profile ratio of rise to width of 1 to 5 for 50 percent or greater of the width of the roofing product; or~~

~~e. Existing ducts in the attic are insulated and sealed according to Section 150.1(c)9; or~~

~~d. Buildings with at least R-38 ceiling insulation; or~~

e. Buildings with a radiant barrier in the attic and without skip sheathing meeting the requirements of Section 150.1(c)2; or

~~f. Buildings that have no ducts in the attic; or~~

g. ~~In Climate Zones 10-15,~~ R-2 or greater insulation above the roof deck.

b. Vented attics in Climate Zones 2, 4, and 8 through 16 shall be insulated to achieve a weighted U-factor of 0.020 or insulation shall be installed at the ceiling level resulting in an installed thermal resistance of R-49 or greater for the insulation alone. Where ceiling insulation is added to an existing vented attic, attic ventilation shall comply with CBC requirements.

EXCEPTION 1 to Section 150.2(b)1Iib: Buildings with at least R-38 existing insulation installed at the ceiling level.

EXCEPTION 2 to Section 150.2(b)1Iib: Buildings without attic access to the attic area.

EXCEPTION 3 to Section 150.2(b)1Iib: Buildings where the alteration that would directly cause the disturbance of asbestos, unless the alteration is made in conjunction with asbestos abatement.

EXCEPTION 4 to Section 150.2(b)1Iib: Buildings with knob and tube wiring located in the vented attic.

EXCEPTION 5 to Section 150.2(b)1Iib: Attics with limited vertical height that do not allow the installation of R-49 may install a lower R-value that maximizes the depth while still meeting code requirements including required air gaps.

EXCEPTION 6 to Section 150.2(b)1Iib: The following shall be considered equivalent to Subsection b:

i. A roof with a minimum aged solar reflectance of XXX and a minimum thermal emittance of 0.75 and with a radiant barrier in the attic meeting the requirements of Section 150.1(c)2; or

ii. A roof with a minimum aged solar reflectance of XXX and a minimum thermal emittance of 0.75; or

iii. R-X or greater continuous insulation installed above the roof deck.

ii. Low-rise residential buildings with low-sloped roofs shall meet the following:

- a. New roofing products Low-sloped roofs in Climate Zones ~~813~~ and through 15 shall have a 3-year aged solar reflectance equal or greater than 0.63 and a thermal emittance equal or greater than 0.75, or a minimum SRI of 75.
- b. Roofs in Climate Zones 2, 4, and 8 through 16 shall be insulated to achieve a weighted U-factor of 0.058 or continuous insulation shall be installed above the roof deck resulting in an installed thermal resistance of R-14 or greater for the insulation alone.

EXCEPTION 1 to Section 150.2(b)1iii: Buildings with no ducts in the attic.

EXCEPTION 12 to Section 150.2(b)1iii: The aged solar reflectance and continuous insulation at the roof deck may be traded off as is ~~can be met by using insulation at the roof deck~~ specified in TABLE 150.2-B.

TABLE 150.2-B AGED SOLAR REFLECTANCE INSULATION TRADE OFF TABLE [TO BE REFINED]

Aged Solar Reflectance	Roof Deck Insulation R-value	Aged Solar Reflectance	Roof Deck Insulation R-value
0.62-0.60	2XXX	0.44-0.40	12
0.59-0.55	4XXX	0.39-0.35	16
0.54-0.50	6XXX	0.34-0.30	20
0.49-0.45	8XXX	0.29-0.25	24