

Residential Roofing: Guide to 2022 Energy Code Requirements

What is the energy code and why does it matter?

California's energy code, the **Building Energy Efficiency Standards** (Title 24, Part 6; the Standards), outlines the energy efficiency requirements for newly constructed buildings and additions and alterations to existing buildings. Energy efficiency reduces energy costs and wasteful consumption, improves building comfort, and reduces environmental impacts of energy use. The Standards ensure that builders use technologies and practices that are energy efficient and cost effective for building owners.

What are the roofing requirements?

The Standards require a building permit when replacing your roof and also require roof replacements to meet certain energy specifications. These specifications are the **thermal emittance** (the relative ability of the roof surface to radiate absorbed heat) and the three-year aged (or "weathered") **solar reflectance** (the fraction of solar energy that is reflected by the roof after three years) of roofing materials used in new construction and re-roofing projects. Another option for compliance is to use the **Solar Reflectance Index** (SRI) (a measure of the constructed surface's ability to stay cool in the sun by reflecting solar radiation and emitting thermal radiation). An SRI calculator can be used to determine the value by inputting the three-year aged solar reflectance and thermal emittance of the desired roofing material.

Roofing products (tile, asphalt shingles, etc.) with high solar reflectance and thermal emittance properties are called "**cool roofs**." Cool roofing products must be certified by the **Cool Roof Rating Councils (CRRC)** (per §10-113 and §110.8(i)) and must have an official CRRC package label indicating compliance. Figure 1 shows a sample of an approved CRRC product label.

Cool roofing requirements are triggered when 50% or more of the roof is being replaced. Any areas of roof covered by building integrated photovoltaic panels and solar thermal panels are exempt. However, the area of roof not covered by photovoltaic panels is still required to meet any applicable cool roof requirements. Cool roofing prescriptive requirements for low-sloped roofs (a roof that has a ratio of rise to run of less than 2:12) are different than requirements for steep-slope roofs. In addition to cool roofing requirements, low-sloped roofs come with additional roof insulation requirements in most climate zones.

Requirements for cool roofs in the Bay Area are limited to parts of Alameda, Contra Costa, and Solano Counties (Climate Zone 12¹) and apply to **new construction and additions** ≥ 300 ft² and for **alterations that replace over 50% of the roof surface** the requirements also extend to parts of Santa Clara County (Climate Zone 4).

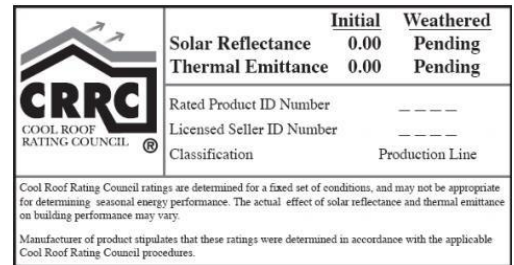
(Step-by-step permit requirement guide on page 2)

Required 2022 compliance documents can be found at:

<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-3>

For more information on 2022 Title 24 Part 6 requirements:

- Visit the California Energy Commission website: www.energy.ca.gov/title24/2022standards/
- Contact the Energy Standards Hotline at (800) 772-3300 or email: title24@energy.state.ca.us
- Contact the BayREN Codes & Standards Program by email: codes@bayren.org



	Initial	Weathered
Solar Reflectance	0.00	Pending
Thermal Emittance	0.00	Pending
Rated Product ID Number	-----	
Licensed Seller ID Number	-----	
Classification	Production Line	

Cool Roof Rating Council ratings are determined for a fixed set of conditions, and may not be appropriate for determining seasonal energy performance. The actual effect of solar reflectance and thermal emittance on building performance may vary.
Manufacturer of product stipulates that these ratings were determined in accordance with the applicable Cool Roof Rating Council procedures.

Figure 1: Sample CRRC Product Label and Information.

Image Source: CEC

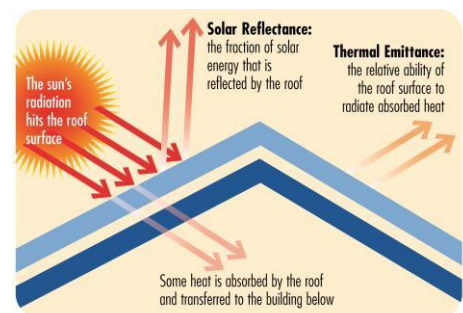


Figure 2: Solar Reflectance and Thermal Emittance.

Image Source: CRRC

¹ California Building Climate Zone Areas: https://ww2.energy.ca.gov/maps/renewable/building_climate_zones.html. For information about roofing requirements in other climate zones, please reference the municipality's municipal code.

ROOF INSULATION REQUIREMENTS FOR LOW-SLOPED ROOF REPLACEMENTS

Low-sloped roof (slope less than 2:12 or 9.5 degrees) replacements shall be insulated to the levels specified in Table 2 below. Please see the exceptions to these requirements on the following page.

Climate Zone	Continuous Insulation R-value	Roof Assembly U-factor
3, 5-7	NR	NR
1, 2, 4, 8-16	R-14	0.039

Table 2: Insulation Requirements for Low-Sloped Roof Replacements

WHEN IS ROOF INSULATION **NOT** REQUIRED

Roof Insulation Exemptions: Roof insulation is not required if any of the following statements about the project are true (please mark the applicable statements.)

The roof construction will have a weight of at least 25 lbs/ft² (e.g. green roofs).

The roof area to be replaced is less than 50% of total.

Area to be re-roofed = _____ ft²

Total roof area = _____ ft²

Total roof area / 2 = _____ ft² (must be less than area to be re-roofed)

The roof is a steep-sloped roof

The existing roof has R-10 or greater continuous insulation above or below the roof deck.

The existing roof has an assembly U-factor of 0.056 or less.

MODIFICATIONS TO THE ROOF INSULATION REQUIREMENT

Exceptions 3 through 5 to Section 150.2(b)11iib of the 2022 Building Energy Efficiency Standards cover situations in which the roof insulation requirements in Table 2 may be reduced. Please check the Energy Efficiency Standards to see if these apply to your project.

COOL ROOF REQUIREMENTS (IN THE BAY AREA, APPLIES ONLY TO CLIMATE ZONES 4 AND 12)

Steep-Sloped Roofs:

For new construction steep-sloped roofs², roofing products in Climate Zones 10 through 15 shall have a minimum aged solar reflectance³ of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16. For alterations the previous requirements apply to Climate Zones 4 and 8 through 15.

Low-Sloped Roofs:

For new construction low-sloped roofs, roofing products in Climate Zones 13 and 15 shall have an aged solar reflectance equal to or greater than 0.63 and a thermal emittance equal or greater than 0.75, or a minimum SRI of 75. For alterations the previous requirements apply to Climate Zones 4 and 6 through 15.

WHEN IS COOL ROOF **NOT** REQUIRED:

Cool Roof Exemptions: A cool roof is not required if any of the following statements about the project are true (please mark the applicable statements.)

The roof construction will have a weight of at least 25 lbs/ft² (e.g. green roofs).

The project is a roof replacement and the roof area to be replaced is less than 50% of total.

Area to be re-roofed = _____ ft²

Total roof area = _____ ft²

Total roof area / 2 = _____ ft² (must be less than area to be re-roofed)

Roof areas covered by building integrated photovoltaic panels and building integrated solar thermal panels are exempt. Note that any area not covered must meet any applicable cool roof requirements.

² A steep-sloped roof is defined as a roof that has a ratio of rise to run of greater than 2:12 (9.5 degrees), while a low sloped roof is defined as a roof that has a ratio of rise to run of less than 2:12 (9.5 degrees)

³ Aged solar reflectance and thermal emittance (both initial and aged thermal emittance values can be used to demonstrate compliance) are tested performance values for roofing products that are available from the manufacturer. The product must have a Cool Roof Council (CRR) label to be shown to the building inspector.

- The project is a steep-sloped roof replacement and there is an attic radiant barrier, where the radiant barrier is not installed directly above the spaced sheathing and the barrier meets the requirements of Section 150.1(c)2.
- The project is a steep-sloped roof replacement and there are/will be **NO** ducts in the attic
- The project is a steep-sloped roof replacement, and the ceiling is insulation with at least R-38 rated insulation or the ceiling assemblies with a U-factor lower than or equal to 0.025
- The project is a steep-sloped roof replacement and there is at least R-2 rated continuous insulation above or below the roof deck

COOL ROOF REQUIREMENT TRADE OFF FOR LOW-SLOPED ROOF REPLACEMENTS:

The aged solar reflectance requirement for low-sloped roof replacements can be met by using insulation at the roof deck specified in Table 1.

Minimum Aged Solar Reflectance	Roof Deck Continuous Insulation R-value (Climate Zones 6-7)	Roof Deck Continuous Insulation R-value (Climate Zones 2, 4, & 8-15)
0.60	2	16
0.55	4	18
0.50	6	20
0.45	8	22
No Requirement	10	24

Table 1: Aged Solar Reflectance Insulation Trade Off

References:

- California Energy Commission. 2022 Residential Compliance Manual. PDF file. December 3, 2022. 2022 Single-Family Residential Compliance Manual: for the 2022 Building Energy Efficiency Standards | California Energy Commission
- Cool Roof Rating Council. California Building Energy Efficiency Standards (Title 24, Part 6). December 7, 2022. CA Title 24 - Cool Roof Rating Council (coolroofs.org)
- Energy Code Ace. 10-113- Rating and Labeling of Roofing Product Reflectance and Emittance. Website. December 7, 2022. 10-113 – RATING AND LABELING OF ROOFING PRODUCT REFLECTANCE AND EMITTANCE (energycodeace.com)
- U.S. Green Building Council (USGBC). December 3, 2019. <https://www.usgbc.org/glossary/term/5590>