



Use this checklist when the project:

- Alters the home's attic ceilings and rafters
- Replaces, adds a new surface area on top of, or re-coats the exterior surface of the existing roofing material

\* This checklist is not intended to support projects in which the enforcement agency requires building design plans and specifications to be submitted with the application for a building permit.

### ESSENTIALS for Attic and Rafter Insulation

**1. Does the project trigger California's Building Energy Efficiency Standards (Title 24, Part 6)?**

YES  NO

- The project triggers Title 24, Part 6 (the Energy Code) if the home's attic has insulation added, or rafter cavity is opened

**2. Does it meet Mandatory Energy Code requirements?**

YES  NO

- Any altered attic ceilings, and rafters must be insulated (even if insulation was not previously installed) to the following requirements in order to comply:

Vented Attic Alteration				
	Climate Zone	New Insulation Requirement <sup>A</sup>	Luminaires in Ceiling	Attic Ventilation
Vented Attic	10	≥ R-49 (for U-factor ≤ 0.020) + Air Sealing <sup>*B</sup>	Maintain Insulation depth above recessed downlight luminaires <sup>**</sup>	Must comply with California Building Code <sup>***</sup>
<p><i>* Exceptions to Insulation:</i></p> <ul style="list-style-type: none"> <li>– Existing ≥ R-19 insulation at ceiling level</li> <li>– When atmospherically vented space heating or water heating combustion appliances are located inside the pressure boundary of the dwelling unit</li> </ul>		<p><i>** Exceptions to insulation depth above recessed downlight luminaires</i></p> <ul style="list-style-type: none"> <li>– Existing ≥ R-19 insulation at ceiling level</li> </ul>		<p><i>*** Exceptions to Attic Ventilation:</i></p> <ul style="list-style-type: none"> <li>– Existing ≥ R-38 insulation installed at ceiling level</li> <li>– Where the alteration would directly cause the disturbance of asbestos</li> <li>– Attic with knob and tube wiring</li> <li>– Where the attic space is not large enough to accommodate the required R-value, the entire accessible space must be filled with insulation provided such installation does not violate Section 806.3 of Title 24, Part 2.5.</li> <li>– If the attic space is shared with another dwelling unit</li> </ul>

### Prescriptive and Mandatory Insulation Requirements for Altered Roofs

Altered Roof Type	Climate Zone	New Insulation Requirement <sup>A</sup>	Compliance Exceptions Based on Existing Insulation
All other Roof Types	10	Rafter: ≥ R-19 between wood framing (or U-factor ≤ 0.054)	No

## ESSENTIALS for Roofing

### 1. Does the project trigger California's Building Energy Efficiency Standards (Title 24, Part 6)?

 YES  NO

- The project triggers Title 24, Part 6 (the Energy Code) if 50% or more of the roof is replaced, recoated or has a new surface layer added on top of it.
- If less than 50% of the roof is altered, it is considered a Repair and does not trigger Energy Code

### 2. Does the project trigger California's Building Energy Efficiency Standards (Title 24, Part 6)?

 YES  NO

- There are two areas of requirements: Roofing Material and Insulation

#### Roofing Material

- Prescriptive requirements for roofing material in Climate Zone 4 depend on the roof type:

**Rated "Cool Roof<sup>c</sup>" Roofing Prescriptive Requirements for Altered Roofs**

Roof Style	Climate Zone	Either		OR SRI <sup>h</sup>
		3-year Aged Solar Reflectance <sup>F</sup>	Thermal Emittance <sup>G</sup>	
Low-sloped <sup>D</sup>	10	≥ 0.63*	≥ 0.75	≥ 75
Steep-sloped <sup>D,E</sup>	10	≥ 0.20**	≥ 0.75	≥ 16

\* Exceptions for low-sloped roofs:

- Roof constructions with a weight of at least 25 lb/ft<sup>2</sup> over
- Any roof area covered by building integrated photo-voltaic
- Altered Roof/Ceiling Insulation Trade-off for Aged Solar Reflectance - Table 150.2-B

**Roof Deck Continuous Insulation Trade-Off R-Value Table 150.2-B**

Minimum Aged Solar Reflectance	Climate Zone 4
0.60	R-16
0.55	R-18
0.50	R-20
0.45	R-22
No Requirement	R-24

\*\* Exceptions for steep-sloped roofs:

- Roof constructions with a weight of at least 25 lb/ft<sup>2</sup> over the roof membrane
- Any roof area covered by building integrated photovoltaic panels or integrated solar thermal panels
- When ceiling assembly U-factor ≤ 0.025 (or ≥ R-38 ceiling insulation)
- When radiant barrier installed (not including when installed above spaced sheathing) meeting install requirements of §150.1(c)2 I
- No ducts are in the attic
- When ≥ R-2 continuous insulation above or below the roof deck

#### Roofing Material

- There are Reroof Insulation requirements for low Slope Roof - requirement

**Prescriptive and Mandatory Insulation Requirements for Altered Roofs Table 150.2-C**

Altered Roof Type	Climate Zone	New Insulation Requirement	Compliance Exceptions Based on Existing Insulation	
Low-sloped when altering roofing material*	10	Continuous ≥ R-14 insulation (or U-factor ≤ 0.039)*	Existing ≥ R-10 continuous above or below roof deck	Existing ≤ 0.056 with ≥ R-19 at rafters in contact with roof deck

\* Exceptions to Table 150.2-C:

- The continuous insulation requirements of Table 150.2-C may be reduced to R-4 where specific conditions are met.<sup>l</sup>
- The continuous insulation requirements of Table 150.2-C may be reduced due to fenestration or door manufacturer's installation instructions per exception 4 to section 150.2(b)1iib.
- Tapered insulation may be used provided average thermal resistance equals or exceeds required value per exception 5 to section 150.2(b)1iib.

- There are no reroof insulation requirements for steep-sloped roofs

**A – J** See page 4 for notes.



### Required Documentation

#### Are Certificates of Compliance (CF1R forms) required?

- Some enforcement agencies may, at their discretion, choose not to require compliance documents for Prescriptive Residential Alteration projects that do NOT require Home Energy Rating System (HERS) verification. Even so, exemptions from submitting compliance documentation must not be deemed to grant authorization for any work to be done in any manner in violation of this code or other provisions of law. See §10-103(a)1C for more information.

#### Does reroofing require Home Energy Rating System (HERS) verification?

- No, if the project is submitting via the Prescriptive Approach for a single-family home (using the [CF1R-ALT-05-E](#)), it will **not** trigger HERS measures.
- If it is submitting via the Prescriptive Approach for an Addition ([CF1R-ADD](#)) or the Performance Approach ([CF1R-PRF](#)) and any HERS measures are required for the scope of work, **all** forms must then be registered with a HERS provider.

#### What forms will the building inspector require?

- The inspector will look for the following forms, which are completed by the installing contractor:  
Non-HERS forms:

[CF2R-ENV-03-E](#): Certificate of Installation for Insulation Installation

[CF2R-ALT-05-E](#): Certificate of Installation for Prescriptive Residential Alterations

[CF2R-ENV-04-E](#): Certificate of Installation for Roofing Ventilation and Radiant Barrier<sup>1</sup>

### Prescriptive or Performance Approach

#### What do you mean by “Performance Approach” to compliance?

- The Performance Approach uses approved modeling software to “tradeoff” energy efficiency measures (so you can do “worse” than Prescriptive requirements for some things and “better” than Prescriptive for others, as long as the Mandatory requirements are met and the energy budget balances). This proof of energy budget balance is documented via the [CF1R-PRF-01-E](#). This may be considered if the project is unable to meet the Prescriptive requirements for reroofing supported by this checklist.

#### Does the Performance Approach allow for “tradeoffs” for opaque envelope alterations?

- Yes, see Attic Insulation Requirements below.

### Attic Insulation Requirements

#### Does my alteration really need to meet ceiling insulation requirement of R-49 or greater?

- Alterations using the Prescriptive Approach require  $\geq$ R-49 insulation at the ceiling level. However, using the Performance Approach, this requirement may be lowered by trading away other elements of the building to show compliance.

#### Where does air sealing happen in my attic alteration?

- The attic alteration project must provide an air seal in all accessible areas of the ceiling plane between the attic and the conditioned space in accordance with §110.7.
- When R-19 insulation is existing at the ceiling level, air sealing is not required.

### Steep-sloped Roofs

#### What is considered a steep-sloped roof?

- Any roof with a rise-to-run ratio equal to or greater than 2:12 (9.5 degrees or more) is considered a steep-sloped roof.

### Low-sloped Reroofs

#### Does reroofing a low-sloped roof trigger insulation requirements?

- Yes, starting with the 2022 Energy Code, insulation is now prescriptively required when reroofing a low-sloped roof but there are exceptions that may apply. This requirement can be traded away using the Performance Approach.

### Rated Cool Roof Material

#### What is a rated Cool Roof material?

- To qualify as a “Cool Roof” under the Energy Code, the roofing material must have a Cool Roof Rating Council (CRRC) rating and meet the specified value for reflectance and emittance, or SRI value, specified in the Certificate of Compliance (CF1R) form.

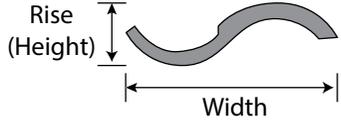
### Solar Photovoltaic (PV)

#### Does a reroofing Alteration project trigger the need to provide Solar PV?

- No, Solar PV standards are not triggered by Alterations. They only apply to construction of new homes under particular circumstances.



## Notes

- A** There are two basic methods for meeting insulation requirements for roof assemblies. The requirements apply specifically to areas of the building envelope that separate conditioned space from unconditioned space or outside air.
1. The most flexible method is to calculate the overall U-factor for each altered construction assembly in the proposed project, and then show that the area weighted average U-factor for each general type of roof/ceiling assembly is less than or equal to the maximum U-factor allowed in the Energy Code. If the applicant uses averaged U-factor values to demonstrate compliance for insulation installation, the **CF1R-ENV-02-E** (Area Weighted Average Calculation Worksheet) must be used to document how the averaged U-factor is achieved.
  2. The simplest method only applies to wood-framed roofs, and it is just to install insulation with the required R-value between the wood framing.
- B.** Air seal all accessible areas of ceiling plane between the attic and the conditioned space in accordance with §110.7. Exceptions may apply.
- C.** To qualify as a Cool Roof under the Energy Code, the roofing material must have a Cool Roof Rating Council (CRRC) rating for aged solar reflectance and thermal emittance.  
Being included in the ENERGY STAR® list is NOT sufficient to meet the Energy Code.  
To find out more about Cool Roof rated products, see the CRRC-Rated Products Directory: [coolroofs.org/products/results](http://coolroofs.org/products/results)
- D.** A steep-sloped roof has a rise-to-run ratio of 2:12 or greater (9.5 degrees or more from horizontal).  
A low-sloped roof has a rise-to-run ratio of less than 2:12 (less than 9.5 degrees from horizontal).
- E.** A Cool Roof is not required if the project involves a steep-sloped roof and its roofing product profile ratio of rise-to-width is at least 1:5 for 50% or more of the width of the roofing product. An example of a tile that would qualify in this exception is shown here, as its height is greater than 1/5 its width. This type of product effectively creates an air gap between the roofing product and the underlying roof assembly, eliminating the requirement for a Cool Roof.
- 
- The diagram shows a cross-section of a roofing tile. A vertical double-headed arrow on the left indicates the 'Rise (Height)' of the tile. A horizontal double-headed arrow at the bottom indicates the 'Width' of the tile. The tile has a wavy, undulating profile.
- F.** “Solar Reflectance” refers to a material’s ability to reflect the sun’s energy back into the atmosphere. The aged solar reflectance is the solar reflectance after three years, which typically is lower than the initial reflectance value. The higher the solar reflectance value, the better.
- G.** “Thermal Emittance” refers to how much of the absorbed heat is rejected by the material. The higher the thermal emittance value, the better.
- H.** “SRI” refers to the Solar Reflectance Index. The SRI provides an alternative to meeting solar reflectance and thermal emittance requirements for Cool Roofs. It is calculated using the **CF1R-ENV-04-E** form based on the CRRC aged solar reflectance, thermal emittance, and the slope of the roof, as well as the effect that these factors have on each other. The higher the SRI value, the better.  
If the roofing product has a thermal emittance that exceeds the Energy Code but a solar reflectance that does not meet the Energy Code – or vice versa – the project might comply using SRI.
- I.** Per §150.1(c)2 of the Energy Code, Radiant Barrier required in Table 150.1-A must meet the requirements specified in §110.8(j) and the installation criteria specified in the Reference Residential Appendix RA4.  
A radiant barrier must have an emittance of 0.05 or less, tested in accordance with ASTM C1371 or ASTM E408, and must be certified to the Department of Consumer Affairs as required by Title 24, Part 23, Chapter 12-13, Standards for Insulating Material.
- J.** The continuous insulation requirements of Table 150.2-C may be reduced to R-4 where:
- Mechanical equipment is located on the roof and will not be temporarily disconnected and lifted as part of the roof replacement, and the addition of insulation would reduce the height from the roof surface to the top of the base flashing to less than that is set forth in the manufacturer’s installation instructions as per California Residential Code §R900; or
  - Replaced roofing abuts sidewall or parapet walls and the addition of insulation would reduce the height from the roof surface to the top of the base flashing to less than that set forth in the manufacturer’s installation instructions as per California Residential Code §R900, provided that the following conditions apply:
    - Sidewall or parapet walls are finished with an exterior cladding material other than the roof covering membrane material; and
    - Sidewall or parapet walls have exterior cladding material that must be removed to install the new roof covering membrane to maintain minimum base flashing height; and
    - The ratio of the replaced roof area to the linear dimension of affected sidewall or parapet walls is less than 25 square feet per linear foot.



# For More Information

## CALIFORNIA ENERGY COMMISSION

[www.energy.ca.gov](http://www.energy.ca.gov)

Learn more about the California Energy Commission (CEC) and its programs on its website.

### 2022 Building Energy Efficiency Standards

[bit.ly/CEC2022Standards](http://bit.ly/CEC2022Standards)

Explore the main CEC web portal for the 2022 Energy Code, including information, documents and historical information.

### 2022 Building Energy Efficiency Standards Summary

[bit.ly/CEC2022Summary](http://bit.ly/CEC2022Summary)

View or download this visual summary of the Energy Code's purpose, current changes and impact.

### 2022 Reference Appendices

[bit.ly/ECA-2022-reference-appendices](http://bit.ly/ECA-2022-reference-appendices)

View the Joint, Residential and Nonresidential Appendices here.

### 2022 Energy Code Single-family Residential Compliance Manual, Chapter 4 – HVAC Requirements

[bit.ly/CEC-2022-SF-residential-compliance-manual](http://bit.ly/CEC-2022-SF-residential-compliance-manual)

### Modernized Appliance Efficiency Database System (MAEDbS)

[bit.ly/MAEDbS](http://bit.ly/MAEDbS)

Search this database to find products that comply with the Energy Code.

### Energy Code Hotline

Call: 1-800-772-3300 (Free)

Email: [Title24@energy.ca.gov](mailto:Title24@energy.ca.gov)

### Online Resource Center

[bit.ly/CEC-ORC](http://bit.ly/CEC-ORC)

Use these online resources developed for building and enforcement communities to learn more about the Energy Code.



[EnergyCodeAce.com](http://EnergyCodeAce.com)

Stop by this online "one-stop-shop" for no-cost tools, training and resources designed to help you comply with California's Title 24, Part 6 and Title 20.



### Tools

[energycodeace.com/tools](http://energycodeace.com/tools)

Explore this suite of interactive tools to understand the compliance process, required forms, installation techniques and energy efficiency regulations in California.

### Reference Ace

[energycodeace.com/content/tools-ace-reference-ace](http://energycodeace.com/content/tools-ace-reference-ace)

Navigate the Title 24, Part 6 Energy Code using an index, keyword search and hyperlinked text.

### Forms Ace

[energycodeace.com/content/tools-ace-forms-ace](http://energycodeace.com/content/tools-ace-forms-ace)

Find the forms that apply to your specific project.

### Energy Code Product Finder

[energycodeace.com/content/product-finder](http://energycodeace.com/content/product-finder)

Find Title 24, Part 6-compliant products.

### Q&Ace

[energycodeace.com/QAndAce](http://energycodeace.com/QAndAce)

Search our online knowledge base or submit your question to Energy Code Ace™ experts.



### Training

[energycodeace.com/training](http://energycodeace.com/training)

On-demand, live in-person and online training alternatives are tailored to a variety of industry professionals and address key measures.



### Resources

[energycodeace.com/resources](http://energycodeace.com/resources)

Downloadable materials provide practical and concise guidance on how and when to comply with California's building and appliance energy efficiency standards.

**Create an account on the Energy Code Ace site and select an industry role for your profile in order to receive messages about all our offerings!**



This program is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E) and Southern California Edison Company (SCE) under the auspices of the California Public Utilities Commission.

© 2023 PG&E, SDG&E and SCE. All rights reserved, except that this document may be used, copied, and distributed without modification. Neither PG&E, SDG&E, nor SCE – nor any of their employees makes any warranty, express or implied; or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any data, information, method, product, policy or process disclosed in this document; or represents that its use will not infringe any privately-owned rights including, but not limited to patents, trademarks or copyrights. Images used in this document are intended for illustrative purposes only. Any reference or appearance herein to any specific commercial products, processes or services by trade name, trademark, manufacturer or otherwise does not constitute or imply its endorsement, recommendation or favoring.