Qualifying as a Cool Roof

To qualify as a cool roof under the Title 24 Building Energy Efficiency Standards, the roofing material must:

+ Have a Cool Roof Rating Council (CRRC) rating for reflectance and thermal emittance
+ Meet the Aged Reflectance and Thermal Emittance — or SRI — values specified in the Standards (see back)

Roofing products must be tested and labeled by the Cool Roof Rating Council. You can search for rated products using the CRRC Rated Products Directory: http://www.coolroofs.org/products/search.php

Solar Reflectance Index

The SRI (Solar Reflectance Index) provides an alternative to meeting solar reflectance and thermal emittance requirements for cool roofs.

The SRI value is calculated based on:

+ The aged solar reflectance and the thermal emittance of the roofing material
+ The roof slope and the total weight of the roofing material

The SRI alternative is useful when a particular product exceeds the Building Energy Efficiency Standards requirement for either the aged solar reflectance or the thermal emittance, but does not meet both requirements. In this case the combination of the aged solar reflectance and the thermal emittance for the product may be sufficient to comply with the SRI requirement.

SRI values range from 0 to 100. The higher the SRI, the better the roofing material’s ability to reduce heat transfer into the building. You can use the SRI calculator to determine the SRI value for a specific product: http://www.energy.ca.gov/title24/2008standards/sri_calculator/

Triggers

The Residential Title 24, Part 6, Standards call for a cool roof when:

+ The project is in an affected climate zone. (This varies by roof style; see the “Requirements” table on the reverse side.)
+ Replacing, recovering or recoating the exterior surface of existing roofs when >50% of the roof is replaced.

Cool Roofs and Reroofing

What Is a Cool Roof?

A cool roof is a roofing product with high solar reflectance and thermal emittance properties, which help reduce cooling loads by lowering roof temperatures on hot, sunny days. Solar reflectance and thermal emittance are properties of the roofing surface — not of insulation that may be used in conjunction with the roofing material.

Although often light in color, cool roofs come in a wide variety of colors ranging from white to black and including blues, grays, greens, oranges, browns, and tans. Cool roofs also are available in a variety of styles: shingle, shake, tile, membrane, and spray-on liquid coatings.

Aged Solar Reflectance & Thermal Emittance

Specific aged solar reflectance and thermal emittance values must be met or exceeded for some climate zones and roof types (see page 2). The higher the solar reflectance, the better (the more heat is reflected from the roofing material).

Solar reflectance refers to a material’s ability to reflect the sun’s energy back into the atmosphere.

Aged solar reflectance is the solar reflectance of the surface after three years, which typically is lower than the initial reflectance value. If the product is new and the aged solar reflectance value is unavailable, you can calculate the aged value using this formula:

$$3\text{-year Aged Solar Reflectance} = [0.2 + \beta (\rho_{\text{initial}} - 0.2)]$$

where

- $\rho_{\text{initial}}$ = Initial Solar Reflectance
- $\beta$ = Soiling Resistance by product type:
  - Field-Applied Coating $\beta = 0.65$
  - Other $\beta = 0.70$

Example: If the initial solar reflectance value is 0.8 for a field-applied coating

$$3\text{-yr Aged Solar Reflectance} = [0.2 + 0.65 (0.8 - 0.2)]$$

$$= 0.2 + 0.39$$

$$= 0.59$$

Thermal emittance provides a means of quantifying how much of the absorbed heat is rejected for a given material. The higher the thermal emittance value, the better (the more heat the roofing material emits back to the atmosphere).
Note: Aged solar reflectance and thermal emittance values noted in tables below must be derived from CRRC Rated Products Directory at http://www.coolroofs.org/products/search.php. Being included in the EPA's ENERGY STAR® list for cool roofing materials is NOT sufficient to meet the Standards. If a roofing product is not CRRC certified, it is assumed to have the following default aged reflectance/emittance values: for asphalt shingles: 0.08/0.75; for all other roofing products, 0.10/0.75.

The following information applies to conditioned (mechanically cooled or heated) residential buildings demonstrating compliance using the Prescriptive approach.

Requirements

<table>
<thead>
<tr>
<th>Roof Style</th>
<th>Climate Zone</th>
<th>Min. 3-yr Aged Solar Reflectance</th>
<th>Min. Aged Thermal Emittance</th>
<th>Min. SRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-slope A</td>
<td>13 &amp; 15</td>
<td>0.63</td>
<td>0.75</td>
<td>75</td>
</tr>
<tr>
<td>Steep-slope A</td>
<td>10 thru 15</td>
<td>0.20</td>
<td>0.75</td>
<td>16</td>
</tr>
</tbody>
</table>

Exceptions... Cool roof is NOT required if:

- Any slope: The roof area is covered by building-integrated photovoltaic panels or building-integrated solar thermal panels.
- Any slope: Building has no ducts in the attic.
- Any slope: Roof is on addition ≤300 ft².
- Any slope: Roof construction has a thermal mass over the roof membrane with a weight of at least 25 lb/ft².
- Steep slope: An air-space of 1.0 inch is provided between top of roof deck and bottom of roofing product.
- Steep slope: Existing ducts in the attic are insulated and sealed according to §150.1(c)(9).
- Steep slope: Building has a radiant barrier in the attic meeting the requirements of §150.1(c)(2).
- Steep slope: Building has at least R-38 ceiling insulation.
- Steep slope: Roofing product profile ratio of rise to width is at least 1:5 for ≥50% of the width of the roofing product.
- Steep slope: R-4 or greater insulation above the roof deck in CZ 10-15.
- Low slope: The aged solar reflectance can be traded off with additional insulation added at the roof deck as per Table 150.2-A.

Values from Table 150.2-A

<table>
<thead>
<tr>
<th>Aged Solar Reflectance</th>
<th>Roof Deck Insulation R-value</th>
<th>Aged Solar Reflectance</th>
<th>Roof Deck Insulation R-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.62–0.60</td>
<td>2</td>
<td>0.44–0.40</td>
<td>12</td>
</tr>
<tr>
<td>0.59–0.55</td>
<td>4</td>
<td>0.39–0.35</td>
<td>16</td>
</tr>
<tr>
<td>0.54–0.50</td>
<td>6</td>
<td>0.34–0.30</td>
<td>20</td>
</tr>
<tr>
<td>0.49–0.45</td>
<td>8</td>
<td>0.29–0.25</td>
<td>24</td>
</tr>
</tbody>
</table>

Documentation

- Permit
- CF1R-ALT-01-E: Certificate of Compliance — Residential Alterations
- General information (Part A, of Page 1 of 5)
- Roofing Replacement (Part C, Page 1 of 5)
- Declaration Statement (Page 5 of 5)

Submitted to the building department by the contractor or the home owner.

+ Optional) CF1R-ENV-04-E: Certificate of Compliance — Solar Reflectance Index Calculation Worksheet
+ CF2R-ENV-05-E: Installation Certificate for Envelope — Insulation; Roofing; Fenestration
+ Description of Roofing Products (top half of Page 1 of 2)
+ Declaration Statement (Page 2 of 2)

The CF2R-ENV-05-E must be completed and signed by the installing contractor and made available for final inspection by building department. CRRC label(s), described below, should be attached to the CF2R-ENV-05-E form.

Product Labeling:

- For all roofs: CRRC label specifying the initial and aged (“weathered”) solar reflectance and thermal emittance
- For liquid-applied roof coatings applied to low-sloped roofs:
  - CRRC label specifying the initial and aged (“weathered”) solar reflectance and thermal emittance
  - Label stating the product meets the ASTM requirements specified in Section 110.8(1)(4) of the Standards.

Product labeling must be available for final inspection by building department.

![CRRC Logo](crrc-logo.png)

The CRRC logo is trademarked by the Cool Roof Rating Council. CRRC Certification is available at no cost to manufacturers and suppliers of roofing products. CRRC label(s) can be obtained from the Cool Roof Rating Council by completing the CRRC's Product Fluid Worksheet or by contacting the CRRC at (850) 408-0550.

Manufacturer of products stipulates that these ratings were determined in accordance with the applicable Cool Roof Rating Council procedures.

A Low-slope = Rise to run ratio of 2:12 or less (9.5 degrees or fewer from horizontal). Steep-slope = Rise to run ratio greater than 2:12 (more than 9.5 degrees from horizontal).

B This includes green roofs (roofs that are covered with vegetation) weighing at least 25 lb/ft², though any portion of the roof not covered with vegetation will need to comply with cool roof requirements if not otherwise exempt.
A. GENERAL INFORMATION

<table>
<thead>
<tr>
<th>01</th>
<th>Project Name:</th>
<th>02</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>Project Location:</td>
<td>04</td>
<td>Compliance Method:</td>
</tr>
<tr>
<td>05</td>
<td>CA City:</td>
<td>06</td>
<td>Building Front Orientation (deg or cardinal):</td>
</tr>
<tr>
<td>07</td>
<td>Zip Code:</td>
<td>08</td>
<td>Number of Dwelling Units:</td>
</tr>
<tr>
<td>09</td>
<td>Climate Zone:</td>
<td>10</td>
<td>Fuel Type:</td>
</tr>
<tr>
<td>11</td>
<td>Building Type</td>
<td>12</td>
<td>Total Conditioned Floor Area:</td>
</tr>
<tr>
<td>13</td>
<td>Project Type</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. BUILDING INSULATION DETAILS (Section 150.2(b)1)

<table>
<thead>
<tr>
<th>Tag-ID</th>
<th>Assembly Type</th>
<th>Frame Type</th>
<th>Frame Depth (inches)</th>
<th>Frame Spacing (inches)</th>
<th>Cavity R-value</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
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<th>06</th>
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<th>09</th>
<th>10</th>
<th>11</th>
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</table>

<table>
<thead>
<tr>
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<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
<th>09</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
</table>

C. ROOF REPLACEMENT (Prescriptive Alteration, Section 150.2(b)1H)

<table>
<thead>
<tr>
<th>Altering &gt; 50% of roof surface</th>
<th>Roof Pitch</th>
<th>Exception</th>
<th>CRRC Product ID Number</th>
<th>Product Type</th>
<th>R-value Deck Insulation</th>
<th>Aged Solar Reflectance</th>
<th>Thermal Emittance</th>
<th>SRI</th>
<th>Aged Solar Reflectance</th>
<th>Thermal Emittance</th>
<th>SRI</th>
</tr>
</thead>
</table>

NOTES

- Mass roof with 25 lb/ft2 not required to comply with cool roof requirements.
- Roof area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof requirements.
- Liquid field applied coatings must comply with installation criteria from section 110.8(i)4.

EXCEPTION:

Registration Number: Registration Date/Time: HERS Provider: January 2014

CA Building Energy Efficiency Standards - 2013 Residential Compliance
DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Compliance documentation is accurate and complete.

   Documentation Author Name: ____________________________  
   Documentation Author Signature: ________________________  
   Company: ____________________________  
   Signature Date: ________________________  
   Address: ____________________________  
   CEA/HERS Certification Identification (if applicable): ________  
   City/State/Zip: ________________________  
   Phone: ____________________________

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. That the energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a registered copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a registered copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

   Responsible Designer Name: ____________________________  
   Responsible Designer Signature: ________________________  
   Company: ____________________________  
   Date Signed: ________________________  
   Address: ____________________________  
   License: ____________________________  
   City/State/Zip: ________________________  
   Phone: ____________________________

For assistance or questions regarding the Energy Standards, contact the Energy Hotline at: 1-800-772-3300.

Registration Number: ____________________________  
Registration Date/Time: ____________________________  
HERS Provider: ____________________________  
CA Building Energy Efficiency Standards - 2013 Residential Compliance  
January 2014
RESIDENTIAL REROOF PROCEDURES FOR COOL ROOF PRODUCTS
2013 CALIFORNIA ENERGY CODE SECTION 150.2(b) H

Beginning July 1, 2014 the 2013 California Energy Efficiency Standards will go into effect and require all re-roofing to meet the Cool Roof requirements of the updated Title 24 Energy Standards. Roofing products that are used for compliance with the standards are required to be tested and labeled by the Cool Roof Rating Council (CRRC).

The 2010 California Energy Code provided exceptions where a Cool Roof product would not be required on reroof projects if approved alternatives were provided. The new 2013 California Energy Code has revised the list of alternatives that can be used as an exception to the Cool Roof requirements. This bulletin is designed to provide the new exceptions allowed in the 2013 Standards and how the local jurisdictions will document and verify compliance with the exceptions.

2010 Cool Roof Exceptions:
   a. Insulation with a thermal resistance of at least 0.85 hr·ft²·F/Btu or at least a ¾ inch airspace is added to the roof deck over an attic; or
   b. Existing ducts in the attic are insulated and sealed according to Section 151(f)10, HERS rating required with CF-4R Form or
   c. Attic ventilation equal to 1/150 of the attic floor area and 30% within 2 vertical of the ridge.
   d. R-30 attic insulation.
   e. Building has a radiant barrier in the attic meeting the requirements of Section 151(f) 2.
   f. Building has no ducts in the attic.
   g. R-3 insulation installed on the deck above vented attic.

2013 Cool Roof Exceptions:  No Exception Changes for 2016
   a. Air-space of 1.0 inch airspace 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% or greater of the width of the roofing product; or
   c. Existing ducts in the attic are insulated and sealed according to Section 150.1(c)9, HERS rating required with CF-3R Form; or
   d. R-38 attic insulation (Insulation Certificate required); or
   e. Building has a radiant barrier in the attic meeting the requirements of Section 150.1(c) 2.
   f. Building has no ducts in the attic.
   g. R-4 insulation installed on the deck above vented attic.

As shown in the comparisons above, the exception by providing increased attic ventilation has been removed in the 2013 Standards, and insulation values have increased.
   • If exception “c” is proposed, it shall be required that a duct leakage test be provided and certified by a third party HERS rater.
   • If exception “d” is proposed, it shall require an Insulation Certificate be provided by a licensed Insulation Contractor to verify the minimum R-38 attic insulation exists.
CERTIFICATE OF INSTALLATION
Roofing and Cool Roofs

If more than one person has responsibility for installation of the items on this certificate, each person shall prepare and sign a certificate applicable to the portion of construction for which they are responsible. Alternatively, the person with chief responsibility for construction shall prepare and sign this certificate for the entire construction. The signer agrees that all applicable Mandatory Measures were met. Temporary labels are not to be removed before verification by the building inspector.

A. COOL ROOF PRODUCT

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed Brand Name</td>
<td>Liquid Coating Type</td>
<td>Required</td>
<td>Aged Solar Reflectance</td>
<td>Thermal Emittance</td>
<td>SRI</td>
<td>Aged Solar Reflectance</td>
<td>Thermal Emittance</td>
</tr>
</tbody>
</table>

If using a liquid coating, indicate whether the type is: (a) Aluminum-Pigmented Asphalt Roof Coating, (b) Cement-Based Roof Coating, or (c) Other.

B. RADIANT BARRIER

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Name</td>
<td>Installation Type</td>
</tr>
</tbody>
</table>

NOTE: Radiant barrier must be installed on gable ends and all other vertical surfaces in the attic.

Installation types are: (1) attached to underside of roof deck, (2) attached to bottom of truss/rafters, (3) attached between truss/rafters, or (4) draped over top of truss/rafters

C. MANDATORY REQUIREMENTS

1. Certification & Labeling, Sections 10-113; 110.8(i): Products must be listed with the Cool Roof Rating Council (CRRC) to use the emittance, reflectance or SRI numbers.

2. Defaults for Noncertified Asphalt Shingles, Section 110.8(i)1A: Asphalt Shingles not listed with the CRRC must use default solar reflectance/thermal emittance values of 0.08/0.75.

3. Defaults for all Other Noncertified Roofing Products, Section 110.8(i)1B: Products not listed with the CRRC must use the default solar reflectance/thermal emittance values of 0.10/0.75.

4. No CRRC Testing for aged solar reflectance, Section 110.8(i)2: if aged CRRC numbers are not available then calculate aged solar reflectance from formula:
   - \( P_{aged} = 0.2 + \beta (P_{initial} - 0.2) \), where \( P_{initial} \) = initial solar reflectance
   - Soiling resistance: \( \beta = 0.65 \) for Field-Applied Coating; \( \beta = 0.70 \) all other roofing products

5. Solar Reflectance Index (SRI), Section 110.8(i)3: SRI values must be calculated using form CF1R-PRSC-WS-04, Cool Roof and SRI Worksheet

6. Liquid Applied Coatings, Section 110.8(i)4: Liquid applied coatings must be applied to the dry mill thickness as required by the manufacturer. The material must meet performance requirements of TABLE 110.8-C

7. Emittance & Certification, Section 110.8(i): Radiant Barrier shall have an emittance of 0.05 or less, be tested with ASTM C1371 or ASTM E408; certified and listed with Department of Consumer Affairs, Standards for Insulating Material.
**CERTIFICATE OF INSTALLATION**

Roofing and Cool Roofs

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Enforcement Agency:</th>
<th>Permit Number:</th>
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<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>Dwelling Address:</th>
<th>City</th>
<th>Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

1. I certify that this Certificate of Installation documentation is accurate and complete.

<table>
<thead>
<tr>
<th>Name:</th>
<th>Signature:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Company:</th>
<th>CEA or CEPE or HERS Certification # if Applicable:</th>
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<tbody>
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<table>
<thead>
<tr>
<th>City/State/Zip:</th>
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</thead>
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</tr>
</tbody>
</table>

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

1. I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.

2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).

3. I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.

4. I reviewed a copy of the Certificate of Compliance (CF1R) approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF1R that apply to the installation have been met.

5. I will ensure that a completed, signed copy of this Certificate of Installation shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Certificate of Installation is required to be included with the documentation the builder provides to the building owner at occupancy.

<table>
<thead>
<tr>
<th>Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Responsible Person's Name:</th>
<th>Responsible Person's Signature:</th>
</tr>
</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>CSLB License:</th>
<th>Date Signed:</th>
<th>Position With Company (Title):</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</table>

Registration Number:  
Registration Date/Time:  
HERS Provider:  
CA Building Energy Efficiency Standards - 2013 Residential Compliance  
January 2014