



# SAN RAFAEL

THE CITY WITH A MISSION

## ROOFING REQUIREMENTS

### Residential & Commercial

1. Ladders provided for inspectors must have a minimum rating of 250 lbs., be tied in place and have a minimum of 3 rungs above the roof.
2. Job Card must be on site at all times. For inspection requests see the instructions printed on the Job Card.
3. When 50% or more of the roof covering is replaced; the roof coverings must be a minimum Class A. In no case shall roofing materials used be less fire resistive than the existing roof.  
**Exceptions:**
  - When less than twenty-five percent (25%) is replaced--At the minimum, materials compatible with the existing roof shall be used.
  - When twenty-five percent (25%) to less than fifty percent (50%) is replaced--At the minimum, a Class C roof covering shall be used.
4. If an overlay is planned, a pre-inspection must be performed, and the permit will not be issued until the pre-inspection has been performed and approved. Someone must be on site with a ladder and capable of providing rooftop and attic access. A maximum of 1 overlay is allowed on built-up, wood shake/shingle, or asphalt roofs.
5. If old roof covering is removed, a tear off inspection is required. The following items shall be completed by the time the inspector arrives:
  - Old roofing completely removed, and deck swept clean.
  - Any decking which is rotten or broken shall be removed and replaced.
  - Stucco at wall junctions shall be broken back to expose lathing for counter flashing.
6. If new plywood roof sheathing is installed, a tear off inspection is not required; however, a plywood nailing inspection is required.
  - Nails overdriven thru the face of the plywood will not be allowed. These must be replaced.
  - When applying plywood over skip sheathing, use minimum 8d nail.
  - Break sheet ends on rafters or use panel sheathing clips.
  - Staples are allowed minimum 16 gauge with 7/16 crown and 2-inch leg.
7. Spark arresters shall be installed at chimney tops on wood burning fireplaces when new roofing is installed. This item will be checked at final.
8. Clearance to combustible materials around flue pipes shall be a minimum of 1" for double walled flues, and minimum 6" for single walled flues. Flues shall be strapped or secured in place at the tear-off inspection.
9. At roof to wall or chimney junction, when exterior walls are stucco, flashings must be installed under lathing paper. Existing stucco must be broken out to expose lath at tear off inspection.
10. Lathing paper shall be installed with a minimum horizontal lap of 2" and a minimum vertical lap of 6". Wire lath shall overlap a minimum of 1" horizontal and vertical. Lathing paper shall lap over flashing a minimum of 2".

11. At roof to wall or chimney junction, when exterior walls are wood siding, the flashing must be installed behind siding and paper. If a new section of siding is to be installed, z-bar shall be installed at the horizontal juncture.
12. If there is mechanical equipment on the roof the following requirements must be met:
  - Access in the form of a fixed ladder must be provided **Exception:** 1. Portable ladder may be used for access for furnaces on the single-story portion of a group R (residential) or U (garage) occupancy.
  - Condensate drains must go to an approved receptor.
  - Conduit and piping must be strapped to pressure treated blocks, masticed to roof.
  - Electrical conduit located under the roof deck insulation must be Type RMT, EMT or FMC.
13. If the roof has parapets, and there is the possibility that water may accumulate, roof drains and secondary (overflow) drains or scuppers will be required, sized per the California Plumbing Code.
  - Overflow drains shall have inlet flow line located 2 inches above the low point of the roof.
  - Scuppers may be installed in lieu of overflow drains in an adjacent parapet wall. The scupper must be 3 times the size of the roof drain, with a minimum height of 4 inches.
  - c. Overflow drains shall drain to an approved location and shall not be connected to the primary roof drain line.
14. All exposed nails are to be sealed with roofing mastic. Rusted or damaged flashings, vent caps, roof jacks, and edgings shall be replaced with new materials. All ABS and PVC vent piping exposed above the roof shall be painted for protection against UV degradation. Plumbing vents must extend a minimum of 6 inches above the roof surface.
15. Attic ventilation will need to meet the code minimum (1/150 of the area being ventilated). Verify that screened openings have not become blocked or painted shut. Eyebrows and ridge vents may need to be installed.
16. If ceiling insulation has become soaked, it must be replaced.
17. Safety requirements when using an asphalt kettle:
  - Provide a minimum 20-B-C fire extinguisher within 30 feet of the kettle when heat source is operating.
  - Provide a minimum 20-B-C fire extinguisher on the roof during coating operations.
  - Kettle must have a tight-fitting cover
  - Shall not be located within 20 feet of any combustible material or building surface.
18. When removing old roofing materials or gravel, avoid stockpiling of materials in one area, so as to not overload the roof structure. Also, when loading new materials onto the roof, be sure to evenly distribute them to avoid any concentrated loads.
19. Electrical service drop anchor must be properly secured at final. PG&E will provide this service at no charge. Owner may contact PG&E at 1-800-743-5000
20. Smoke detectors are not required as a result of reroofing work.
21. When reroofing causes the roof sheathing to be removed, a radiant barrier (reflective insulation) shall be installed in conjunction with the reroofing project SMC 12.12.020.
22. Cool Roofing might be required (see the attached California Energy Commission "Blueprint" to help determine requirements).



CALIFORNIA ENERGY COMMISSION

# BLUEPRINT

EFFICIENCY AND RENEWABLE ENERGY DIVISION

- In this Issue:
- Cool Roof Requirements Under the 2008 Building Energy Efficiency Standards
  - HERS Verification Requirements for the Alternate Charge Measurement Procedure
  - CSLB Enforcement Efforts

## Cool Roof Requirements Under the 2008 Building Energy Efficiency Standards

### WHAT ARE COOL ROOFS?

The term *cool roof* refers to a roofing product with high solar reflectance and thermal emittance properties. These properties help reduce cooling loads by lowering roof temperatures on hot, sunny days. There are numerous materials in a wide range of colors that meet cool roof requirements.

### WHAT'S NEW IN THE 2008 STANDARDS REGARDING COOL ROOFS?

Under the 2005 Building Energy Efficiency Standards (2005 Standards), cool roofs were required only when using the prescriptive approach for low-sloped roofs in nonresidential buildings. Under the 2008 Standards:

- Cool roofs are required when using the prescriptive approach for most low-sloped and steep-sloped roofs in residential and nonresidential buildings.
- Cool roof requirements vary by climate zone and roofing material weight.
- Solar reflectance values are now based on their reflectance properties after three years (known as "aged reflectance") as opposed to their initial values.
- A Solar Reflectance Index (SRI) has been developed to provide another means of demonstrating compliance.



Photo Credit: ASC Building Products

### WHAT ARE SOLAR REFLECTANCE AND THERMAL EMITTANCE?

*Solar reflectance* refers to a material's ability to reflect the sun's energy back into the atmosphere, much like how light is reflected by a mirror. Even for materials with high solar reflectance, a portion of the sun's energy is absorbed and stored as heat. Once absorbed, some of this heat is rejected, or emitted, back into the air. *Thermal emittance* provides a means of quantifying how much of the absorbed heat is rejected for a given material. Materials with good solar reflectance and thermal emittance properties are critical in delivering the low surface temperatures associated with cool roofs.



**WHAT IS THE SOLAR REFLECTANCE INDEX (SRI)?**

The SRI provides an alternative to meeting solar reflectance and thermal emittance requirements for cool roofs. The SRI allows for tradeoffs between the minimum solar reflectance and thermal emittance values that would otherwise be used for compliance under the prescriptive approach. The SRI values range from 0 to 100, with a higher SRI being better.

**WHO RATES COOL ROOF MATERIALS?**

The Cool Roof Rating Council (CRRC) is the sole entity the California Energy Commission recognizes for certifying the solar reflectance and thermal emittance values of roofing products. Only reflectance and emittance values listed within the CRRC's Rated Products Directory, at [www.coolroofs.org/products/search.php](http://www.coolroofs.org/products/search.php), may be used to meet cool roof requirements.

**WHY DO THE STANDARDS CALL FOR AGED REFLECTANCE VALUES RATHER THAN INITIAL REFLECTANCE VALUES?**

As a roofing material ages, its ability to reflect heat decreases. Using an aged reflectance value rather than an initial reflectance value more accurately represents how a roofing material will perform over time. If an aged reflectance value is not yet in the Rated Products Directory, the following equation may be used to calculate the aged Solar Reflectance, where  $\rho_{\text{initial}}$  is the initial solar reflectance value found in the directory:

$$\text{Aged Reflectance}_{\text{calculated}} = (0.2 + 0.7[\rho_{\text{initial}} - 0.2])$$

**ARE LIQUID-APPLIED ROOF COATINGS ALLOWED TO BE USED IN CALIFORNIA?**

Absolutely. When used to take performance compliance credit or to meet prescriptive requirements for reflectance and emittance, liquid-applied roof coatings (like any other roofing products) must have a clearly visible packaging label that lists the solar emittance and the initial and three-year aged reflectance from the CRRC's Rated Products Directory.

Additionally, packaging for liquid-applied roof coatings must state that the product meets the ASTM requirements specified in Section 118(i) 4 of the *Standards*.

**WHAT ARE THE MINIMUM REQUIREMENTS NEEDED TO DEMONSTRATE COMPLIANCE WITH THE PRESCRIPTIVE APPROACH?**

The following tables show the minimum solar reflectance, thermal emittance, and SRI values needed to demonstrate compliance under the prescriptive approach. If a climate zone is not listed in the tables for a given building type and roof characteristic, cool roofs are not required for that climate zone, building type, and roof characteristic. These requirements apply only to *conditioned buildings*, buildings that are mechanically heated or cooled. A *low-sloped* roof has a rise to run ratio of 2:12 or less. A *steep-sloped* roof has a rise to run ratio greater than 2:12. Please refer to [www.energy.ca.gov/maps/building\\_climate\\_zones.html](http://www.energy.ca.gov/maps/building_climate_zones.html) or call the Energy Efficiency Hotline at (800) 772-3300 to find out what climate zone a proposed project is in.



Photo Credit: MonierLifetile



RESIDENTIAL BUILDINGS

Climate Zone	Roof Characteristic(s)	Aged Reflectance	Emittance	SRI
13 & 15	Low-sloped	0.55	0.75	64
10-15	Steep-sloped and roofing product density < 5 lb/ft <sup>2</sup>	0.2	0.75	16
1-16	Steep-sloped and roofing product density ≥ 5 lb/ft <sup>2</sup>	0.15	0.75	10

NONRESIDENTIAL BUILDINGS

Climate Zone	Roof Characteristic(s)	Aged Reflectance	Emittance	SRI
2-15	Low-sloped	0.55	0.75	64
2-16	Steep-sloped and roofing product density < 5 lb/ft <sup>2</sup>	0.2	0.75	16
1-16	Steep-sloped and roofing product density ≥ 5 lb/ft <sup>2</sup>	0.15	0.75	10

HIGH-RISE RESIDENTIAL BUILDINGS, HOTELS, AND MOTELS

Climate Zone	Roof Characteristic(s)	Aged Reflectance	Emittance	SRI
10, 11, 13-15	Low-sloped	0.55	0.75	64

RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE THE MANUFACTURER CERTIFIES USE IN ALL CLIMATE ZONES

Roof Characteristic(s)	Aged Reflectance	Emittance	SRI
Low-sloped	0.55	0.75	64
Steep-sloped and roofing product density < 5 lb/ft <sup>2</sup>	0.2	0.75	16
Steep-sloped and roofing product density ≥ 5 lb/ft <sup>2</sup>	0.12	0.75	10

**ARE THERE ANY EXCEPTIONS TO THE ABOVE REQUIREMENTS?**

- Cool roofs are not required for a roof area covered by building-integrated photovoltaic panels or building-integrated solar thermal panels.
- Cool roofs are not required for low-sloped roof constructions that have thermal mass over the roof membrane with a weight of at least 25 lb/ft<sup>2</sup>. This includes green roofs (roofs that are covered with vegetation) weighing at least 25 lb/ft<sup>2</sup>, though any portion of the roof not covered with vegetation will need to comply with cool roof requirements if not otherwise exempt.
- Cool roofs are not required for nonresidential wood-framed roofs in climate zones 3 and 5 if the roof assembly has a U-factor\* of 0.039 or lower.
- Cool roofs are not required for nonresidential metal-framed roofs in climate zones 3 and 5 if the roof assembly has a U-factor of 0.048 or lower.

\*In general terms, U-factor describes how readily a building material transmits heat; a lower U-factor indicates that a material is a better insulator.



- The following exceptions and alternatives to the prescriptive requirements apply to residential alterations:

SLOPE	COOL ROOFS ARE NOT REQUIRED IN THE FOLLOWING SITUATIONS
Low-Sloped	<ul style="list-style-type: none"> <li>• Building has no ducts in the attic.</li> </ul>
Steep-Sloped	<ul style="list-style-type: none"> <li>• Insulation with a thermal resistance of at least 0.85 hr-ft<sup>2</sup>°F/Btu or at least a 3/4-inch air-space is added to the roof deck over an attic.</li> <li>• Existing ducts in the attic are insulated and sealed according to §151(f)10.</li> <li>• In climate zones 10, 12, and 13, with 1 ft<sup>2</sup> of free ventilation area of attic ventilation for every 150 ft<sup>2</sup> of attic floor area, and where at least 30 percent of the free ventilation area is within 2 feet vertical distance of the roof ridge.</li> <li>• Building has at least R-30 ceiling insulation.</li> <li>• Building has a radiant barrier in the attic meeting the requirements of §151(f)2.</li> <li>• Building has no ducts in the attic.</li> <li>• In climate zones 10, 11, 13, and 14, R-3 or greater roof deck insulation above vented attic.</li> </ul>

**WHAT ARE THE INSULATION REQUIREMENTS FOR ROOF ALTERATIONS?**

If reroofing certain building types with low-sloped roofs that have less than R-7 insulation, new insulation must be installed that meets the requirements of the table below.

Climate Zone	Nonresidential Buildings		High-Rise Residential Buildings and Guest Rooms of Hotels and Motels	
	Continuous Insulation R-value	U-factor	Continuous Insulation R-value	U-factor
1, 3-9	R-8	0.081	R-14	0.055
2, 10-16	R-14	0.055	R-14	0.055



Photo Credit: MonierLifetile



## HERS Verification Requirements for the Alternate Charge Measurement Procedure

For an air conditioner that is installed when the outdoor temperature is below 55°F, the installing contractor must use the Alternate Charge Measurement Procedure (Weigh-in Charging Method, Reference Residential Appendix RA3.2.3). Every system on which the Alternate Charge Measurement Procedure was used must be field verified by a Home Energy Rating System (HERS) rater, using the Standard Charge Measurement Procedure (Reference Residential Appendix RA3.2.2), when the outdoor temperature is above 55°F. Group sampling is not allowed for HERS verification compliance for systems when the installing contractor used the Alternate Charge Measurement Procedure.

Note that, according to Reference Residential Appendix RA2.4.4, an enforcement agency may approve compliance credit for refrigerant charge measurement when installers have used the Alternate Charge Measurement Procedure. This approval will be on the condition that the installer provides a signed agreement to the builder, with a copy to the enforcement agency, to correct the refrigerant charge if the HERS rater determines at a later time, when the outside temperature is above 55°F, that correction is necessary.

If the Alternate Charge Measurement Procedure was used, the installing contractor must complete and submit a CF-6R-MECH-26-HERS. If the Standard Charge Measurement Procedure was used, the installing contractor must complete and submit a CF-6R-MECH-25-HERS. When either charge measurement procedure was used by the installing contractor, the HERS rater must complete and submit a CF-4R-MECH-25.

## CSLB Enforcement Efforts

Beginning in January 2010 the Contractors State License Board (CSLB) accelerated their enforcement efforts against contractors who are performing work without required building permits. CSLB notes that permit violations are not only a health and safety issue for property owners, but can also be a financial liability if someone is injured.

Contractors performing work without a required permit are subject to disciplinary action by CSLB. If you know of a contractor who is performing work without a required permit, you should notify CSLB and the local building department where the work is being performed. CSLB has developed a "Permit Violation Referral Form" to report offenders and on November 30, 2009, issued *Industry Bulletin # 09-19* to address this issue.

The California Energy Commission, CSLB, California Building Officials (CALBO), and your local building jurisdictions are working to help locate and identify suspected offenders. These agencies, with the assistance of the Attorney General's Office, are actively investigating complaints to increase compliance with the *Building Energy Efficiency Standards* and other codes, to level the playing field for the licensed contractors who pull permits and perform work as required by the codes, ordinances, and standards.

To obtain a copy of the "Permit Violation Referral Form" and review the CSLB *Industry Bulletin*, go to the following Energy Commission website:

[www.energy.ca.gov/title24/2008standards/changeout/](http://www.energy.ca.gov/title24/2008standards/changeout/)

## Building Energy Efficiency Standards Training

Please visit the Energy Commission's new **Energy Education Center** at:

[www.energyvideos.com](http://www.energyvideos.com)

For training offered by utilities and others, please visit the following websites:

**PG&E**

[www.pge.com/mybusiness/edusafety/training/pec/classes/](http://www.pge.com/mybusiness/edusafety/training/pec/classes/)

**SoCal Gas Company**

<http://seminars.socalgas.com>

**San Diego Gas and Electric**

<http://seminars.sdge.com>

**SCE**

[www.sce.com/b-sb/energy-centers/workshops-classes.htm](http://www.sce.com/b-sb/energy-centers/workshops-classes.htm)

**SMUD**

[www.smud.org/en/education-safety/](http://www.smud.org/en/education-safety/)

**CALBO**

[www.calbo.org](http://www.calbo.org)

**CABEC**

[www.cabec.org](http://www.cabec.org)



**Flex Your Power News**

[www.fypower.org/news](http://www.fypower.org/news)



[www.gosolarcalifornia.org](http://www.gosolarcalifornia.org)

*The 2008 Building Energy Efficiency Standards are now in effect.*

Arnold Schwarzenegger  
Governor



**CALIFORNIA ENERGY COMMISSION**

Karen Douglas  
Chairman

James D. Boyd  
Vice Chair

Jeffrey D. Byron  
Commissioner

Anthony Eggert  
Commissioner

Robert B. Weisenmiller  
Commissioner

Melissa Jones  
Executive Director

Claudia Chandler  
Chief Deputy Director

Valerie Hall  
Deputy Director  
Efficiency and Renewable Energy

Building Standards Implementation Office  
1516 Ninth Street, MS-26  
Sacramento, CA  
95814-5512  
(916) 654-4064

## BLUEPRINT

Erik Jensen  
Editor

**Special Thanks to:**

Valerie Hall, Betty LaFranchi, Bill Pennington, Vanessa Byrd, Eurllyne Geiszler, Gary Flamm, Sam Lerman, Payam Bozorgchami, Jeff Miller, Diana Todd, Beverly Duffy, and Carol Robinson for their help in the creation of this edition of the *Blueprint*.

**Need Help?**  
**Energy Standards Hotline**  
(800) 772-3300  
or (916) 654-5106