



# Know What's Cool: Cool Roof Codes and Programs UPDATE

July 2009

## ENERGY CODES

### California's Title 24

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

The California Energy Commission (CEC) adopted an **update to California's Building Energy Efficiency Standard, Title 24, which will take effect January 1, 2010**. If the building permit application is submitted after January 1, 2010, then the new standards must be met.

Some new additions relating to cool roofs include:

- A prescriptive requirement for steep slope and residential cool roofs
- Use of 3-year aged solar reflectance data
- Requirements limited to specific climate zones
- Lower required reflectance values for products that have a density greater than or equal to 5 pounds/ft<sup>2</sup>

Also, many of the minimum requirements allow a Solar Reflectance Index (SRI) calculation in lieu of individual solar reflectance and thermal emittance values. Note that there are exceptions to many of these requirements; please see the CEC document for details. For more details on the prescriptive requirements for solar reflectance and thermal emittance requirements, see the summary table at the end of this document.

Section 10-113 of Title 24, establishes rules for implementing labeling and certification requirements relating to reflectance and emittance for roofing products. It designates the Cool Roof Rating Council (CRRC) as the supervisory entity for radiative properties of roofing materials; no substantive changes have been made to this section. Section 118 explains that roofing products must be certified and labeled, and if not, will assume default ratings for aged reflectance and emittance values.

### City of Chicago

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

The Chicago Energy Conservation Code will require that new residential and commercial low-slope (up to 2:12) roofs have a minimum initial solar reflectance value of 0.72 or a three-year aged value of 0.50. New medium slope roofs (2:12 to 5:12) will be required to have a minimum initial solar reflectance value of 0.15. Steep slope roofs (greater than 5:12), will be exempt from any initial solar reflectance requirements. The code requires that products must be rated by the CRRC or by Energy Star and pertains to all roofs permitted on or after January 1, 2009.

### City of Dallas

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

Dallas City Council unanimously adopted a green construction ordinance in April 2008 aimed at reducing energy and water consumption in all new houses and commercial construction. The ordinance will be implemented in two phases starting in 2009. The first phase, effective October 1, 2009, requires that all low-slope commercial projects less than 50,000 square feet meet the EPA's Energy Star low-slope roof requirements (an initial solar reflectance of at least 0.65 and an aged solar reflectance of at least 0.50). For commercial projects over 50,000 square feet, Phase 1 requires buildings to meet 85 percent of the points required under the appropriate USGBC's Leadership in Energy and Environmental Design (LEED) rating system for a certified level. Phase 2 will begin October 1, 2011 and will apply to all proposed projects.

### Florida State Building Code 2007

[www.floridaenergycommission.gov](http://www.floridaenergycommission.gov)

The Florida Building Code 2007, chapter 13-4, states that all roofs are required to have a rated R-value of insulation with the exception that if they meet the specified cool roof requirement then the proposed roof can have an adjusted U-factor. Cool roofs are defined as having a minimum solar reflectance of 0.70 and minimum thermal emittance of 0.75. The code requires that the values for solar reflectance and thermal emittance shall be determined by a laboratory accredited by a nationally recognized accreditation organization, such as the Cool Roof Rating Council CRRC-1 Product Rating Program. These provisions of the 2007 Florida Energy Code became effective October 1, 2008.

## **International Energy Conservation Code (IECC)**

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

The International Code Council approved updates to the International Energy Conservation Code (IECC) on September 24, 2008 and the changes will be incorporated into the 2009 version of the IECC. The 2003, 2006, and 2009 versions of the IECC reference ASHRAE 90.1, including cool roof measures.

## **ASHRAE Standards 90.1 and 90.2**

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

### **ASHRAE Standard 90.1 (2007 edition)**

Energy Standard for Buildings Except Low-Rise Residential Buildings, section 5.5.3.1.1, still defines a cool roof as having a minimum solar reflectance of 0.70 and a minimum thermal emittance of 0.75, but the new version also allows a minimum Solar Reflective Index of 82. The new standard for 90.1 increases the applicable climate zones areas to 1 to 5 (the previous version was from 1 to 3). The section also states that values for solar reflectance and thermal emittance shall be determined by a laboratory accredited by a nationally recognized accreditation organization, citing the CRRC as an example.

### **ASHRAE Standard 90.2 (2007 edition)**

Energy Efficient Design of Low-Rise Residential Buildings, section 5.6, defines a cool roof in climate zones 1, 2, and 3 as having a minimum solar reflectance of 0.65 and a minimum thermal emittance of 0.75 OR a minimum Solar Reflectance Index (SRI) of 75. "High Albedo Roofs" are a prescriptive requirement and if installed allow the residential building to have a lower R-value and a higher U-value. The section also states that values for solar reflectance and thermal emittance shall be determined by a laboratory accredited by a nationally recognized accreditation organization, citing the CRRC as an example.

## **GREEN BUILDING PROGRAMS**

### **ASHRAE Advanced Energy Design Guides**

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

ASHRAE produces Advanced Energy Design Guides, including the Advanced Energy Design Guide for Small Office Buildings and Small Retail, and the new Advanced Energy Design Guides for K-12 School Buildings and Small Warehouses/Self Storage Buildings. These guides provide an approach to achieving 30% in energy savings beyond the minimum requirements in Standard 90.1. In climate zones 1, 2, and 3, which cover southern U.S. states, the design guide includes a suggestion for cool roofs and references the CRRC's Product Rating Program.

### **USGBC's LEED 2009**

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

The United States Green Building Council (USGBC) is updating their Leadership in Energy and Environmental Design (LEED) program to LEED 2009. The final version is scheduled for released by the end of November 2008.

LEED 2009 includes significant structural changes as well as changes to individual credits. The previous version of LEED for New Construction included a cool roof credit when at least 75% of the roof is covered with a material that met or exceeded the minimum SRI (low slope = 78, steep slope = 29). The new credit keeps this requirement, but allows for a lower SRI if more than 75% of the roof is covered, as long as the metric of  $SRI * ft^2$  meets or exceeds the equivalent  $SRI * ft^2$  of the 75% requirement. In other words, for a 100  $ft^2$  low slope roof you could either cover 75  $ft^2$  with a material with an SRI value of at least 78 (=5850  $SRI * ft^2$ ), or you could cover the entire 100  $ft^2$  of the roof with a material with an SRI value of at least 58.5 (=5850  $SRI * ft^2$ ).

LEED 2009 includes new point allocations for the various credits. There are now a total of 100 possible points for a given project (as opposed to the 69 points possible in previous versions). The cool roofing credit is still worth a single point and will be available for every LEED program offered, including LEED for Schools, LEED for Existing Buildings, LEED for Core and Shell and, LEED for Homes.

The new LEED system will also include four Regional Credits, which will be determined by USGB chapters in each region. These credits will reward buildings for addressing certain region-specific sustainability issues. The regional credits are still under development and no drafts have been released to the public.

## Green Globes

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

Green Globes is an online rating system that uses performance benchmark criteria to evaluate a building's energy consumption. It compares the building design against data generated by the EPA's Target Finder, which reflects real building performance. Buildings earn a rating between one and four globes. Green Globes includes a cool roof credit for roofs that have a minimum solar reflectance of 0.65 and a minimum thermal emittance of 0.90. One to ten points are awarded based on the percent of the roof covered with cool roof material. A project can earn a total of 350 in the Energy category and 1000 points for the whole rating program.

## Built it Green's GreenPoint Rated

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

GreenPoint Rated is a program of Build it Green, a non-profit membership organization whose mission is to promote healthy, energy- and resource-efficient homes in California. GreenPoint Rated has modules for New Homes, Multifamily units and Existing Homes.

A GreenPoint Rated home is evaluated by independent, certified raters in five categories and bears the GreenPoint Rated label if it scores more than 50 out of 300 total points on its "report card." The GreenPoint Rated program has a mandatory requirement that homes exceed Title 24 requirements by at least 15% in energy savings. A cool roof based on Title 24 requirements is one of many energy-saving strategies that will help reach this requirement.

GreenPoint Rated is an accessible point of entry for green homes in California and is compatible with programs such as ENERGY STAR for Homes, LEED for Homes Program, the National Association of Home Builders' guidelines, and California Green Builder.

## Collaborative for High Performance Schools

[www.chps.net](http://www.chps.net)

The Collaborative for High Performance Schools (CHPS) is the nation's first school building rating program whose mission is to facilitate the design, construction, and operation of high performance schools. CHPS has been based in California since 2001, though schools nationwide have committed to CHPS standards and have been rated by the program. The CHPS program requires that roof materials have a minimum initial solar reflectance of 0.70 and a minimum initial thermal emittance of 0.75 while covering a minimum of 75% of the roof area, and that the radiative properties are verified through the CRRC.

## REBATE PROGRAMS

More and more utilities across the US are providing incentives for cool roofs. In addition to the programs that are listed in the Ratings, Codes and Program brochure, a sample of new rebate programs includes:

- Texas: Bryan Texas Utilities, San Antonio's CPS Energy, Austin Energy
- Florida: Florida Light and Power, Progress Energy, Gainesville Regional Utilities
- North and South Carolina: Progress Energy
- Arizona: Salt River Project
- California: Pacific Gas and Electric Company, Southern California Edison, Sacramento Municipal Utility District, Burbank Water and Power

For more information and updates on any of the above codes or programs, please contact each organization directly.

## CONTACT US

Visit the CRRC at [www.coolroofs.org](http://www.coolroofs.org) or contact us directly:

Tel: 1-866-465-2523 (toll-free in the U.S.)

[info@coolroofs.org](mailto:info@coolroofs.org)

**Title 24, Part 6, of the California Code of Regulations: California's Energy Efficiency Standards for Residential and Nonresidential Buildings**  
**Summary of the adopted 2008 Cool Roof Prescriptive Requirements (as of 6/30/08)**  
Original CEC documents available at: <http://www.energy.ca.gov/title24/2008standards/rulemaking/documents/index.html>

Section		Construction Type	Occupancy Type	Slope	Roofing Product Density	Climate Zone	Minimum 3 year Aged Solar Reflectance	Minimum Thermal Emittance	Minimum Solar Reflectance Index (SRI)	Notes	Page
143	Prescriptive	New Construction	Non residential	Low Slope	N/A	Zones 2-15	0.55	0.75	64	*Exceptions	127
143	Prescriptive	New Construction	Non residential	Steep Slope	<5 lbs/ft <sup>2</sup>	Zones 2-16	0.2	0.75	16	*Exceptions	127
143	Prescriptive	New Construction	Non residential	Steep Slope	> or = 5 lbs/ft <sup>2</sup>	Zones 1-16	0.15	0.75	10	*Exceptions	127
143		New Construction	High rise residential buildings, hotels, motels	Low Slope	N/A	Zones 10,11,13,14,15	0.55	0.75	64	*Exceptions	127
143 c		New Construction	Relocatable Public School Buildings Where Manufacturer certifies use in all climate zones	Low Slope	N/A	Zones ALL	0.55	0.75			134
143 c		New Construction	Relocatable Public School Buildings Where Manufacturer certifies use in all climate zones	Steep Slope	<5 lbs/ft <sup>2</sup>	Zones ALL	0.2	0.75			134
143 c		New Construction	Relocatable Public School Buildings Where Manufacturer certifies use in all climate zones	Steep Slope	> or = 5 lbs/ft <sup>2</sup>	Zones ALL	0.15	0.75			134
149		Re-Roofing (Replacements, recovering or recoating)	Non-residential	Low Slope	N/A	Zones 2-15	0.55	0.75	64	* Where more than 50% of the roof or more than 2,000 square feet of roof, whichever is less is being replaced, recovered or relocated. *Exceptions	186
149		Re-Roofing (Replacements, recovering or recoating)	Non-residential	Steep Slope	<5 lbs/ft <sup>2</sup>	Zones 2-16	0.2	0.75	16	* Where more than 50% of the roof or more than 2,000 square feet of roof, whichever is less is being replaced, recovered or relocated. *Exceptions	186
149		Re-Roofing (Replacements, recovering or recoating)	Non-residential	Steep Slope	> or = 5 lbs/ft <sup>2</sup>	Zones 1-16	0.15	0.75	10	* Where more than 50% of the roof or more than 2,000 square feet of roof, whichever is less is being replaced, recovered or relocated. *Exceptions	186
149		Re-Roofing (Replacements, recovering or recoating)	High rise residential buildings, hotels, motels	Low Slope	N/A	Zones 10,11,13,14,15	0.55	0.75	64	* Where more than 50% of the roof or more than 2,000 square feet of roof, whichever is less is being replaced, recovered or relocated. *Exceptions	186
151	Prescriptive	New Construction	Low Rise Residential	Steep Slope	<5 lbs/ft <sup>2</sup>	Zones 10-15	0.2	0.75	16	*Exceptions	209
151	Prescriptive	New Construction	Low Rise Residential	Steep Slope	> or = 5 lbs/ft <sup>2</sup>	Zones 1-16	0.15	0.75	10	*Exceptions	209
151	Prescriptive	New Construction	Low Rise Residential	Low Slope	N/A	Zones 13 and 15	0.55	0.75	64	*Exceptions	209
151	Prescriptive	Re-Roofing	Low Rise Residential	Low Slope	N/A	Zones 13 and 15	0.55	0.75	64	*Exceptions	209
152	Prescriptive	Re-Roofing (Replacements)	Low Rise Residential	Steep Slope	<5 lbs/ft <sup>2</sup>	Zones 10-15	0.2	0.75	16	* Where more than 50% of the roof or more than 1,000 square feet of roof, whichever is less is being replaced, recovered or relocated. *Alternatives/Exceptions	218
152	Prescriptive	Re-Roofing (Replacements)	Low Rise Residential	Steep Slope	>5 lbs/ft <sup>2</sup>	Zones 1-16	0.15	0.75	10	* Where more than 50% of the roof or more than 1,000 square feet of roof, whichever is less is being replaced, recovered or relocated. *Alternatives/Exceptions	219

Equation to obtain an aged value if the product does not have an aged Value listed in the CRRC Directory and only has the current value:

$$* REFLECTANCE_{AGED} = (0.2+0.7[\rho_{in}-0.2])$$

\*  $\rho_{in}$  = Initial Reflectance listed with the CRRC

Title 24 Energy Hotline

(800) 772-3300 (within CA)

(916) 654-5106 (outside CA)