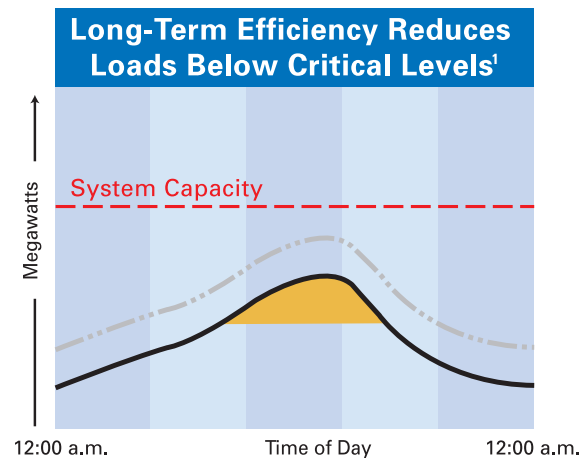
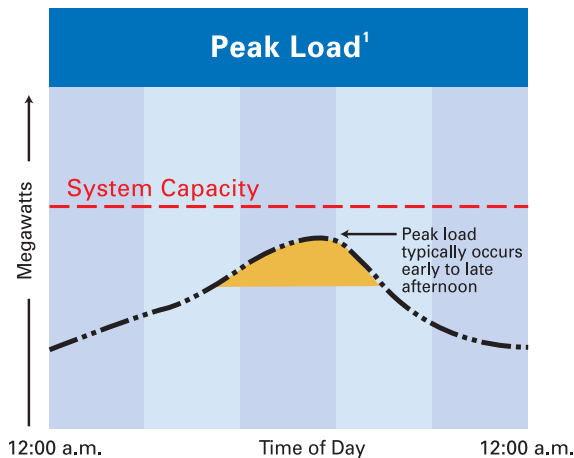


The Basics of California's Title 24 Regulations

What Is Title 24: It's the Law – and Now It Applies to Roofing.

Title 24, Part 6 of the California Code of Regulations - the Energy Efficiency Standards for Buildings passed into law in 1978 – was updated effective October 1, 2005. The purpose of the law is to reduce energy consumption in California – particularly the kind of peak energy demand that attributed to the rolling blackouts of 2000 and 2001.



¹ Produced for the U.S. Department of Energy by the National Renewable Energy Laboratory, a DOE national laboratory, DOE/GO-102002-1613, September, 2001.

The law is updated every three years to take advantage of new energy efficiency technologies and methods. As of October 1, 2005, the law regulates – for the first time – energy efficiency for roofs in California.

Standards for Cool Roofing

To qualify as a cool roof under the new Title 24 standards, roofing products must be tested and rated according to the system developed by the Cool Roof Rating Council (CRRC), which is the only rating system recognized for Title 24 compliance. In California, a cool roof is defined as a roof system that has a minimum of 0.70 reflectivity and 0.75 emissivity. Although a cool roof is required under the prescriptive approach, designers can select a non-cool roof by following specific steps in the Performance or Trade-off compliance methods.

How Title 24 Works

For each proposed new building, the California Energy Commission (CEC) establishes an energy "budget" based on a computer simulation of the building's one-year energy use (kBtu/ft²/yr). The energy budget is used to establish component requirements outlined in the prescriptive approach. Designers for the proposed building can either follow the same prescription of energy features to comply with Title 24, or have the option to select alternate components, as long as the new design meets or exceeds the energy savings outlined in the energy budget. Additional calculations are needed to validate compliance with the new design.



Two prescriptive approaches for meeting the "budget"

- **Standard prescriptive approach (Envelope Component Method):** This is the simplest but least flexible approach. An applicant need only show that each building component meets or exceeds the prescriptive requirement for that climate zone. No calculations are needed to demonstrate compliance, however there is no flexibility to trade off components that have a lower energy savings than the prescribed values. Within the prescriptive approach, cool roofs are a default requirement to comply with Title 24. A cool roof can, however, be traded for another component of equal or greater energy efficiency using the building envelope approach detailed below.
- **Prescriptive "trade-off" approach for the building envelope (Overall Envelope):** A subset of the Prescriptive method, the overall envelope approach allows for some flexibility in component selection where a non-mandatory component can be "traded" for one of equal or greater energy performance. For example, an owner can elect to install a non-cool roof if enough roof / ceiling insulation is added to meet or beat the prescribed energy budget. The energy performance of the substituted component must be assessed and documented using the calculation under this approach.

For low-sloped non-residential roofs over conditioned space, cool roofs are one of the required features in the standard prescriptive approach.

A designer can select a to install a non-cool roof as long as other components in the building design compensate for the increased solar heat gain incurred by not having a cool roof.

Whole building performance approach

- This approach provides the greatest flexibility in the building design but requires the most documentation. Using this approach, a detailed calculation must be performed using CEC approved software where the energy efficiency of the entire building is calculated with the desired components, and compared to the prescribed energy budget. Just as before, the new design must meet or beat the prescribed energy budget. Energy consultants are often utilized in this approach due to the complexity.

The performance approach is most commonly used with new construction or during a major remodel where multiple components of the building envelope are being altered.

Building and Project Types Affected

Title 24 applies to all new construction, alterations or additions (including reroofing projects). The cool roof provisions of Title 24 impact a building project if the application for a building permit was submitted on or after October 1, 2005.

The law requires compliance whether a permit is applied for or not. Building owners are bound by California law to assure their buildings meet the California Code of Regulations.

If a building is considered non-residential, has a low-sloped roof (slope less than 2:12) and is mechanically air-conditioned or heated, it will need to be in compliance with Title 24.

Occupancy Groups Affected

Office buildings	Assembly/conference areas	Churches
Grocery stores	Commercial/industrial warehouses	Theaters
Restaurants	Schools	Industrial work buildings

Not all buildings have to comply with Title 24, part 6. Buildings with the USBC / IBC group "I" (Institutional) designation. Hospitals, nursing homes and prisons fall into this category. Qualified historic buildings (as defined in part 8 of the State Historic Building Code) and buildings outside of the jurisdiction of California are also exempt.

Roof Replacements Guidelines

Low-sloped non-residential roofs must meet the new requirement when half of the roof, or 2,000 sq. ft. (whichever is less), is being reroofed. There is one exception for certain conditions when gravel on a built-up roof is removed down to the membrane and new gravel is added as a replacement. This does not include removing the entire membrane – just the gravel surfacing.

Simple guidelines for Insulation

Insulation Guidelines:

If the building requires a cool roof...

Roof Installed	Existing Insulation	Insulation Reroof Requirement
Cool Roof	+ Existing insulation is disturbed	= Replace the insulation at the same level or greater
Cool Roof	+ Existing insulation is not disturbed	= No additional insulation is required
Cool roof	+ None	= No additional insulation is required
Non-cool roof	+ Yes	= Calculate and install additional insulation*
Non-cool roof	+ None	= Calculate and install additional insulation*

** must use overall envelope trade-off or the performance approach*

Other Requirements that Could Impact Roofing

Laying insulation batts on top of suspended ceilings is no longer sufficient, except in air-conditioned spaces with a combined floor area not greater than 2,000 sq. ft. in an otherwise unconditioned building, and when the average space between the ceiling and roof is greater than 12 ft. Otherwise, to achieve the appropriate R-value, insulation must be installed directly under the deck, or roof insulation must be installed on top of the deck.

Who's Responsible for What

Responsible Party	Their Responsibility
Owner	• Provide code-compliant building (even if permit is not required)
Owner's Architect or Construction Manager	• Project coordination including building permits
Energy Consultant	• Handle all Title 24 calculations and documentation
Roofing Contractor	• Install systems that meet Title 24. If a permit is required, furnish appropriate documentation to the Building Department.
Roofing Products Manufacturers	• Provide products that meet code. Products should be properly labeled and Title 24 standards; test with supervisory entity (CRRC); affix CRRC label
Permitting Agency / building official	• Inspect and enforce Title 24 compliance. Ensure all plans comply with the California Code of Regulations and furnish appropriate documentation.

How to Comply

Designers can specify and use the following JM roofing membranes or coatings, which are rated 0.70 or greater for reflectivity and 0.75 or greater for emissivity, according to the rating system provided and listed by the Cool Roof Rating Council (CRRC):

- *Glaskap® CR* white mineral surfaced, white acrylic coated, fiber glass cap sheet for use in built-up roofing systems. The unique surfacing provides protection to the underlying asphalt and membrane, as well as the benefit of a reflective, emissive surface.
- *JM PVC with Elvaloy®* white, single ply roofing membranes: JM PVC 50, JM PVC 60, and JM PVC 80; and JM PVC Fleece-Backed 50 and JM PVC Fleece-Backed 60.
- *JM TPO* white, single ply membrane systems
- *TopGard® 4000 and TopGard® 5000* white acrylic coatings: These coatings may be applied directly over BUR, SBS and APP membranes. They must be applied at a rate to achieve a minimum dry mil thickness of 20 (0.02"). The physical properties of these JM coatings meet all ASTM minimum performance requirements, as specified by the CRRC.

Title 24 Compared to Other Standards

As shown in the table below, Title 24 roofing standards require a similar reflectivity to other standards. For the roofing industry in particular, all of these rating systems have one thing in common, all have set standards for cool roof reflectivity and/or emissivity. Below are some key points to help distinguish between each of the various programs that incorporate cool roofs. The reflectivity and emissivity values for Title 24 are highlighted in yellow.

- Some of these standards are voluntary, while others are mandatory.
 - Title 24 is mandatory in California.
 - LEED (Leadership in Energy and Environmental Design) is highly encouraged among a growing list of city, state and federal agencies.
 - ENERGY STAR® is generally voluntary. However, meeting the ENERGY STAR standard for roofing reflectivity and emissivity can help earn points in the LEED rating system.

Program	Requirement	Reflectivity	Emissivity	SRI***
Title 24 (CRRC)	Mandatory	0.70	0.75	N/A
ENERGY STAR	Voluntary*	0.65	0.75**	N/A
LEED	Voluntary*	See SRI	See SRI	78

CRRC lists product emissivity information according to ASTM C 1371.

LEED accepts products tested for emissivity according to ASTM E 1980.

Results may vary between test methods.

** Although voluntary, some local and state authorities are requiring designers to adhere to these guidelines for specific building types (i.e., government or state funded projects).*

*** ENERGY STAR emissivity standard not in effect until later 2006.*

**** SRI is determined by using the reflectivity values, emissivity values, and the steady state temperature equations defined in ASTM E 1980-01.*



Johns Manville

Roofing Systems Group
717 17th Street
Denver, CO 80202
1-800-654-3103
www.jm.com