

SECTION 3

RESIDENTIAL ENERGY STANDARDS (TITLE 24, PART 6, CALIF. ADMIN. CODE)

All new buildings, additions and alterations to existing buildings in California must meet the Energy Efficiency Standards contained in Title 24, Part 6 of the California Code of Regulations. Alterations that do not increase both the floor area and volume of the building need only meet the minimum mandatory measures. Compelling reasons exist for more energy efficient buildings including increased comfort, lower utility bills, reduction of environmental damage, and contributing to the reduction of greenhouse gases.

To comply with the Title 24 California Administrative Code Residential Standards, a building must be shown to meet two basic requirements:

Installation of mandatory measures representing minimum conservation features and devices;
and

Demonstration that the building's predicted annual energy use meets the designated energy budget for space heating and cooling and water heating. In order to comply with the budget, additional requirements above the minimum mandatory measures may be necessary.

WHERE TO GET HELP

Copies of the **2005 Residential Compliance Manual** are available as a free download at the California Energy Commission's (CEC) website:

http://www.energy.ca.gov/title24/2005standards/residential_manual.html

Questions regarding the **2005 Building Energy Standards** may be directed to the Energy Hotline at (800) 772-3300 or (916) 654-5106.

HOW TO COMPLY WITH THE RESIDENTIAL STANDARDS

To comply with the Residential Standards, the permit applicant should follow these general steps:

1. Verify that the Residential Standards apply and that the correct climate zone is used for the building location.
2. Demonstrate that the building meets the Standards with one of two compliance options: Prescriptive Packages or Approved Computer Method.
3. Document and coordinate all calculations, plans, and specifications. This includes completing a Certificate of Compliance (CF-1R). The designer or owner must sign the Certificate of Compliance. A blank copy of the recommended Certificate of Compliance (CF-1R) form is available for review at PRMD or as a download at the CEC's website.
4. Provide a lighting control diagram on the electrical pages of the plans submitted. Diagram shall include location of dimmer switches, occupant sensors, etc. per lighting mandatory measures section below.

5. Include all appropriate mandatory features and provisions applicable to the building design and install all specified conservation measures in the building. The equipment installer is responsible for verifying and complying with the efficiencies used to achieve compliance. A copy of the form CF-6R shall be posted near the building permit.

Each page of the CF-6R shall be signed by the installing subcontractor, the general contractor, or the owner. Not all pages of the CF-6R shall apply to all jobs, only pages reflecting work on the building permit need be submitted.

If required by the compliance calculations, a field verification and/or diagnostic testing form CF-4R must be completed by a certified HERS rater and submitted to the building department.

6. With a new dwelling unit: Deliver a 'California Home Energy Guide available from the CEC.

SONOMA COUNTY CLIMATE ZONES

Since energy use depends partly upon weather conditions which differ throughout the state, the California Energy Commission has established 16 climate zones representing distinct microclimates within California. The following Sonoma County areas are located in Climate Zone 1: Annapolis, Bodega, Bodega Bay, Cazadero, Duncan Mills, Fort Ross, Jenner, Ocean View, Plantation, Sea Ranch, Soda Springs, and Stewart's Point. Other areas of the county are located in Climate Zone 2. More detailed information on zone boundaries is available at the PRMD.

COMPLIANCE WITH THE ENERGY BUDGET

There are two general options for demonstrating that a residential building meets the energy budget with any of these compliance paths, mandatory measures must be met.

Prescriptive Packages ("Alternative Component Packages")
Computer Methods (Alternative Calculation Method)

Detailed information on each of the methods is available in the 2005 edition of the Residential Energy Manual, published by the California Energy Commission. Compliance forms for the Prescriptive Packages are available at PRMD and as a free download at the CEC's website.

Prescriptive packages

The Standards provide a prescriptive approach to compliance using an "alternative component package" or prescriptive package of building conservation features. This approach is the simplest and least flexible compliance path. It is simple because an applicant need only show that a building meets each minimum or maximum level prescribed in the set of requirements contained in a package and because few calculations are needed to demonstrate compliance. Buildings constructed according to Package D, Alternative to Package D, or in certain circumstances Package C are deemed to meet the energy budget. Packages C & D require that a HERS rater come to the building and perform diagnostic testing to verify that the air distribution ducts are properly sealed and that split system air conditioners or heat pumps either have the proper refrigerant charge and the proper airflow across the evaporator coil or have a thermostatic expansion valve.

Compliance documentation to be submitted with this approach:

CF-1R, Certificate of Compliance (required)
MF-1R, Mandatory Measures Checklist (required)
WS-5R, Kitchen Lighting Worksheet
HVAC sizing calculations

These forms may be required:

CF-SR, Solar Water Heating Calculation Form
WS-1R, Thermal Mass Worksheet
W2-2R, Area Weighted Average Calculation Worksheet
WS-3R, Solar Heat Gain Coefficient (SHGC) Worksheet
WS-4R, Fenestration - Maximum Allowed Worksheet

These additional forms are required during construction:

CF-4R, Field Verification and Diagnostic Testing (if applicable)
Installation Certificate (CF-6R)

Computer methods

State-approved “alternative calculation methods” or computer methods represent the most detailed and sophisticated performance approach to compliance. This method provides the greatest flexibility in design.

To comply with the Standards, the predicted combined energy use of the proposed design cannot exceed the combined energy budget of the standard design which is based on the building having all the conservation features of the Package D Prescriptive Method.

Compliance documentation to be submitted with this approach includes:

CF-1R, Certificate of Compliance (required)
MF-1R, Mandatory Measures Checklist (required)
WS-5R, Kitchen Lighting Worksheet
HVAC sizing calculation

These additional forms are required during construction:

Installation Certificate (CF-6R)
Form CF-4R, Field Verification and Diagnostic Testing (if applicable)

LIGHTING MANDATORY MEASURES

Kitchen Lighting

At least 50% of the total rated wattage of permanently installed luminaires in the kitchen must be in luminaires that are high efficacy luminaires as defined in Table 105-C of the Energy Code. The quantity and type of fixtures should match what has been documented on the form WS-5R.

High-efficacy lighting may not be screwed into medium base incandescent sockets and shall be on separate switches from any incandescent lighting.

Bathrooms, Garages, Laundry Rooms and Utility Rooms

Lighting in bathrooms, garages, laundry rooms and/or utility rooms must be high efficacy, or must be controlled by a manual-on occupant sensor.

Other Rooms

Permanently installed lighting in other rooms must be high efficacy, or a manual-on occupant sensor or a dimmer must control it. "Other rooms" includes hallways, dining rooms, family rooms and bedrooms—the rooms in which people are most aware of interior design both in terms of fashion and the usability of their living space.

Exception 3 to §150 (k) 4 specifies that permanently installed luminaires that are not high efficacy luminaires can be allowed in closets less than 70 square feet. These luminaires may be controlled by a simple toggle switch, manual-on occupant sensor, or an automatic-on occupant sensor.

Outdoor Lighting

Outdoor lighting attached to a building must be high efficacy, or controlled by a motion sensor with integral photocontrol. Motion sensors used in conjunction with outdoor lighting luminaires should have the capability of turning the lights on automatically. Light around swimming pools, water features, or other locations subject to Article 680 of the California Electric Code are exempt.

Decorative landscape lighting that is not permanently attached to buildings is not regulated by the Standards.

High Efficacy Lamps

High Efficacy Lamps. A high efficacy luminaire is one that contains only high efficacy lamps and must not contain a conventional (medium) screw-based socket. There are two qualifying requirements for a high efficacy luminaire: that the lumens per watt are above a specified threshold and that electronic ballasts are used for all lamps that are 13 watts or greater. The lumens per watt requirement is also based on wattage. Lamps less than 15 watts may be 40 lumens/watt, lamps 15-40 watts must be at least 50 lumens/watt and lamps greater than 40 watts must be at least 60 lumens per watt in order to be considered high efficacy.

Currently lamps with electronic ballasts have four-pin lamp holders rather than the two-pin holders found on lamps with magnetic ballasts. There are other lamp holders that are being considered by the lighting industry for the future.

Residential Manual-On Occupant Sensors

In bathrooms, garages, laundry rooms, and utility rooms, manual-on/automatic-off occupant sensors are allowed as an alternate compliance option to high efficacy lighting. Manual-on/automatic-off occupant sensors automatically turn lights off if an occupant forgets to turn them off when a room is unoccupied. Additionally, these sensors should readily provide the occupant with the option of turning the lights off manually upon leaving the room.

Occupant sensors must be "manual-on", i.e., the sensors must not have the ability to turn the lights on automatically and must not have a setting that can leave the lights in a permanent-on position.

Some models of occupant sensors have the capability to be changed by the occupant to "automatic-on" by removing the switch plate or touch plate and changing switch settings. These occupant sensors are acceptable as long as the mechanism to switch settings is not visible to the occupant, cannot be easily accessed without the removal of a switch plate or touch plate, and as long as they are delivered to the building site and installed with the "manual-on" setting.

Recessed Lighting

Luminaires recessed in insulated ceilings must meet three requirements:

- They must be rated for direct insulation contact (IC).
- They must be certified as airtight construction.
- They must have a sealed gasket or caulking between the housing and ceiling to prevent the flow of heated or cooled air out of the living areas and into the ceiling cavity.

WINDOW LABELS

The Standards require that manufactured windows have both temporary and permanent labels that show the NFRC performance characteristics. The temporary label shows the U-factor and SHGC, for each rated window. The label must also show that the windows meets the air infiltration criteria. The temporary label must not be removed before inspection by the enforcement agency. The inspector will verify that the installed product meets or exceeds the efficiencies assumed by the energy documentation.

RADIANT BARRIERS

The prescriptive requirements call for a radiant barrier in climate zones with significant cooling loads (2,4 and 8 through 15). A radiant barrier is a reflective material that reduces radiant heat transfer caused by solar heat gain in the roof. Radiant barriers reduce the radiant gain to air distribution ducts and insulation located below the radiant barrier. In the performance approach, radiant barriers are modeled as separate adjustments to the heating U-factor and the cooling U-factor. The duct efficiency is also affected by the presence of a radiant barrier, with the performance approach.

Radiant barriers must meet installation criteria as specified in Section 4.2.1 of the *Residential Compliance Manual*.

The most common way of meeting the radiant barrier requirement is to use roof sheathing that has a radiant barrier bonded to it in the factory. Oriented strand board (OSB) is the most common material available with a factory-applied radiant barrier. The sheathing is installed with the radiant barrier (shiny side) facing down toward the attic space. Alternatively, a radiant barrier material that meets the same ASTM test and moisture perforation requirements that apply to factory-laminated foil can be field-laminated. Field lamination must use a secure mechanical means of holding the foil to the bottom of the roof decking such as staples or nails that do not penetrate all the way through the roof deck material.

Other acceptable methods are to drape a foil type radiant barrier over the top of the top chords before the sheathing is installed, and stapling the radiant barrier to the underside of the truss/rafters (top chord). For these installation methods, the foil must be installed with spacing requirements as described in Section 4.2.1 of the *Residential Compliance Manual*. The minimum spacing requirements do not apply to this installation since it is considered a "laminated" system.

Installation of radiant barriers is somewhat more challenging in the case of closed rafter spaces when sheathing is installed that does not include a laminated foil. Foil may be field-laminated after the sheathing has been installed by "laminating" the foil as described above to the roof sheathing between framing members. This construction type is described in the *Residential Compliance Manual*, Section 4.2.1 and illustrated in figure 3-12, which can be found at the following link

http://www.energy.ca.gov/title24/2005standards/residential_manual.html