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Title 24...What Builders Should Know About California's New Energy Code

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California's Energy Code (Title 24) has been around since 1978. However, recent changes that went into effect on October 1, 2005, will have a significant impact on metal buildings. Contractors and builders will deal with these changes as part of the building permit application, including the construction documents and the compliance forms. The 2005 edition of Title 24 is estimated to be about 11% more stringent than the 2001 edition. These changes impose new requirements for the building envelope and mandate increased energy efficiency in lighting and mechanical systems.

Contractors and builders in California should be well versed in the Title 24 procedures for applying for a building permit. These have been in place for many years. A certificate of compliance must be signed by the person responsible for the building design that confirms the required energy saving features are properly incorporated. However, due to the changes in the insulation requirements for metal buildings and the prescriptive requirement for a cool roof, it is not as simple to find a cost-effective compliance approach with the 2005 version of Title 24. An energy consultant may be required to help navigate through the requirements for a particular project in order to find the best compliance approach.

Compliance Approaches

Three compliance approaches are available in Title 24. They are: (1) prescriptive component; (2) overall envelope, or building envelope trade-off; and (3) whole building performance.

The prescriptive component approach is probably the only method in which an energy consultant would not be required on a project because no calculations would need to be made or presented for the approval process. This method stipulates the minimum requirements for the separate components of the building envelope, HVAC system, service water-heating system, lighting system, outdoor lighting system and signage. The disadvantage of this approach is that there is no flexibility—you must meet the minimum requirement for each component or system.

The building envelope trade-off approach only applies to the envelope components but it provides more flexibility than the prescriptive approach. It permits you to have less than the prescriptive requirement for any envelope component as long as the overall heat gain and heat loss for the entire envelope is less than or equal to that computed for a similar building with the minimum prescriptive requirements. This is where an energy consultant can assist in comparing different scenarios for roof insulation, wall insulation, windows and skylights. It is also where the decision can be made as to whether a white painted

roof, or cool roof, would be a more economic choice than putting more insulation in the building.

The whole building performance approach offers the most flexibility. It allows an energy budget comparison between a building with the prescriptive systems and a proposed building. The advantage to the whole building performance method is that you can trade off more efficient lighting or mechanical systems with envelope requirements and vice versa. An energy consultant is definitely needed to carry out this approach. However, it may result in the most economic balance between insulation, lighting and HVAC system components.

Envelope Requirements

The most significant change in the 2005 Title 24, with regard to the building envelope, was the addition of a cool roof prescriptive requirement for low-slope (2:12 or less) non-residential buildings that are conditioned. However, this means that a cool roof is only required if the prescriptive component approach is used. With the other two compliance approaches, you can trade a cool roof for other energy savings elsewhere in the envelope or lighting and mechanical systems.

The 2005 Title 24 also requires that the Cool Roof Rating Council (CRRC) certify the cool roof properties. Otherwise, a lower default reflectivity value is assigned in the envelope trade-off or whole building performance approaches and can lead to more insulation in the roof and/or walls. This makes it important to use a CRRC-rated roof product—even if it doesn't qualify as a cool roof—so the rated properties can be used.

The cool roof prescriptive requirements also apply to reroofing of some existing, non-residential low-slope roofs. The requirements apply if more than 50% or more than 2,000 sq. ft. of roof (whichever is less) is being replaced, recovered or recoated. This probably means a white painted roof will have to be installed, unless other extensive reworking of the envelope is being carried out and a trade-off—such as more insulation or energy-efficient windows—is possible.

Lighting Requirements

Another new requirement for low-rise conditioned or unconditioned spaces that are greater than 25,000 sq. ft. is that at least one-half of the floor area must be daylit by skylights. This applies if the ceiling height is greater than 15' and lighting-power density for general lighting is equal to or greater than 0.5 watts per sq. ft. In addition to the skylight requirement, electric lighting in the daylit area must be controlled using automatic, multilevel controls or a multilevel astronomical time switch.

Retail, auditorium and office applications must have 10% to 25% lower lighting power densities than previously allowed. The code also requires use of more efficient “manual-on/automatic-off” occupancy sensors.

In addition to regulating indoor lighting applications, any external building lighting, extending up to the property line, is subject to maximum installed allowances. Exterior

lighting is also subject to new mandatory measures, such as lighting shut-off controls and, in certain applications, multilevel switching.

Mechanical Requirements

In previous versions of the code, variable speed drives have been required on variable-air-volume systems with motors greater than 25 horsepower (HP). The 2005 code now requires drives on motors that are rated 10 HP and above.

In addition, a new mandatory measure requires demand-control ventilation on many smaller HVAC systems. This requirement typically is achieved with a carbon dioxide (CO₂) sensor that detects levels of occupancy based on CO₂ levels and then adjusts the outside air provided by the mechanical system.

Prior to receiving final occupancy on non-residential buildings in California, a new series of functional tests must be performed on HVAC systems and lighting-control systems. Certificate of Acceptance forms must be filled out in the field, demonstrating that most HVAC and lighting systems have been tested and are performing correctly.

Get Educated

MBMA conducted three educational training sessions last April for builders on how a metal building can comply with the 2005 Title 24 requirements. MBMA is looking to repeat the sessions in 2006 for interested build-ers. More information can be obtained by emailing mbma@mbma.com.

Additional information about the 2005 Title 24 requirements and posted interpretations can be found on CEC's website energy.ca.gov/title24/. To locate a certified energy consultant the California Association of Building Energy Consultants is a good resource, cabec.org.

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