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Cool Metal Roofing Under California Title 24

By Gregory L. Crawford

Anyone in the commercial roofing business in California should already know that the 2005 California Title 24 Energy Code goes into effect this October. It represents a dramatic change for metal roofing usage in low-rise, low slope non-residential buildings with conditioned space. To be concise: bare metal roofing will simply not qualify as a cool roof and will therefore have limited application when permitting begins under the new Code. Painted metal roofing can qualify, but the path to compliance is not necessarily easy.

Thus, all are affected by the new 2005 Code, from building owners to architects, contractors, and even local code officials themselves who have to learn and apply the requirements. Recognizing this new Code needed close examination and better understanding, the Cool Metal Roofing Coalition engaged the Architectural Energy Corporation (formerly Eley Associates) to review it in detail relative to the use of metal roofing and to provide compliance strategies.

Quoting from the AEC report, "In order to comply using the prescriptive path, the 2005 Building Energy Efficiency Standards require that a certified cool roof (reflectance greater than or equal to 0.70 and emissivity no less than 0.75) is installed in all low-rise, low slope non-residential buildings. This cool roof requirement, as well as the roof insulation requirement, does not apply if the space is not heated or cooled."

Further, "Analysis was done for three roof surface types: unpainted, white-painted, and dark-painted metal roof. The assumed reflectance/emissivity for these surfaces are 0.68/0.10, 0.65/0.80, and 0.25/0.80 respectively. These values were specified...to be used in this study. None of these roof surfaces meets the prescriptive cool roof requirement. The white metal roof is close, but its reflectivity is 0.65. Therefore, either the envelope tradeoff compliance method or the whole building performance compliance method must be used. Note that some white metal roof products may have reflectances of 0.70 or greater, and those would meet the prescriptive requirements."

Thus, the report shows that virtually all metal roofing is dramatically affected by the 2005 Code. In essence, bare metal roofing has been regulated out of the market. And, unless the architect takes extra steps beyond the prescriptive method, by using the envelope trade-off method or the whole building method, many painted roofing products will not be allowed. These alternate methods

are not insurmountable, but require time and money, two highly precious resources for building owners, architects, and contractors.

How does one “suddenly” learn all about how to comply with the new 2005 Code? It is, of course, an extension of the current 2000 Code, but with the differences noted above and in the sidebar. The details are the elusive part. Building owners, architects, and contractors may wish to seek workshops for their respective needs, to include specific requirements of local code officials. To that end, the Metal Building Manufacturers Association held three regional workshops for contractors in April of this year. Other workshop opportunities should present themselves, by way of energy consultants or state programs.

If the 2005 California Title 24 Energy Code in itself doesn't seem to be enough for new changes in the metal roofing market, hang onto your hats! This year is also the time that the California Energy Commission begins its 2008 Energy Code revision cycle. This future Code version is expected to include new provisions for residential buildings and steep slope non-residential buildings. In July, the appointed consultant for the CEC will start gathering recommendations for review and potential adoption, all part of an eighteen month process toward drafting the new Code and putting it into effect.

The Cool Metal Roofing Coalition has been in communication with the CEC several times in order to participate in the process. We provided testimony in Sacramento last September on our concerns with the 2005 Code. Then, in December, we supplied this information again as part of our 2008 revision cycle comments. In February, the Coalition traveled to meet directly with the CEC on these current and future code developments. The Coalition offered the collective expertise of its membership to develop better outcomes for all.

The Coalition has several goals for beneficially changing the 2008 Code. One is to have the superior aged performance of metal roofing properly recognized. Metal roofing may have lower initial reflectance or emissive properties than some competing materials but yet display equal or better performance when aged three years or longer. Under the 2005 Code, a competing material may qualify while the metal roofing would not, due to the fact the Code incorrectly assumes reflective performance ages uniformly among all materials. Therefore, the report on aged reflectance completed last year by Oak Ridge National Laboratory has been provided to the CEC for their consideration.

Another goal of the Coalition is for the 2008 Code to account for the natural differences among the 16 designated climate zones of California. Presently, the Code assumes one climate zone as the default for all of California, even though several zones have more heating days than cooling days in the year. Under that condition, bare painted roofing with less emittance may provide better energy

performance overall. The Coalition is engaging Oak Ridge National Laboratory to conduct research on regional emittance in California so that appropriate documentation can be provided to the CEC within the revision cycle.

The Coalition notes that it is possible that the California Title 24 Energy Code can potentially be adopted by other states nationally, changing little but the name of the state itself. Part of this potential migration is facilitated by the Cool Roof Rating Council (CRRC), which provides the only listing source for approved cool roof products. As various states look for cool roofing to reduce energy consumption and peak demand of their own buildings, the CRRC is a recognized product information source that serves a comprehensive Code. While Canada is also looking at cool roofing, their approach would need to consider significant differences, namely, the greater number of heating days.

Whether in California or elsewhere, the topic of cool roofing is definitely hot. We need to remember that cool metal roofing provides the best all around performance with its reflective and emissive qualities, recycled content at beginning of life, durability for a long service life using fewer resources, and recyclability at end of life for incorporation into new generations of products.

Detailed discussion and conclusions are provided in AEC's *Report: An Analysis of Metal Roofing Compliance Options for California's Title 24 2005 Energy Standard, Revised April 29, 2004*. It can be requested as a PDF document from the Cool Metal Roofing Coalition online at www.coolmetalroofing.org. Many other materials are available on the Web site as well, including the *Cool Metal Roofing Brochure* and *Cool Facts About Cool Metal Roofing*.

*******Possible Sidebar on Compliance Approaches from the Eley Report*******

"The Standards offer three approaches to compliance:

- A. The prescriptive path, which requires certified cool roofs. The prescriptive path has other requirements.... As noted below in the Task discussion, the cool roof and roof insulation requirements do not apply to spaces that do not have any heating or cooling....**
- B. The envelope trade-off method allows for certain trade-offs within the envelope parameters to meet specified heat gain and heat loss factors for compliance. The trade-off method includes building parameters such as insulation of roof and walls, glazing and framing type for fenestration, exterior shades etc. While the heat loss factor depends only on thermal transmittance (U-factor) of the various envelope surfaces, the heat gain factor is also affected by the reflectance and the emissivity of the roof, and orientation and solar heat gain coefficient (SHGC) for fenestration products.**

C. The whole building method involves energy simulations to compare the performance of the proposed design to a code-complying baseline design. This method allows trade-offs between performance of different building systems, including envelope, HVAC, lighting, and water-heating. The comparison is based on time-dependent valuation of energy. The hourly electricity and gas simulation results are multiplied by factors that vary by time of day and by season. Therefore, energy consumed during peak periods (as defined by the CEC) counts more than off peak energy. The end result is similar to a comparison of utility costs using time-of-use rates."

*******End of Sidebar on Compliance Approaches*******