



Energy-saving roofs

Codes and standards for cool metal roofing

By Gregory L. Crawford

From all perspectives, metal roofing is looking up with its cool, energy-saving properties and long, cost-effective service life. Whether selected by way of building owner and architect preference, green building rating systems, or code requirements, metal roofing is providing more options than ever with its superior performance, style and color.

Rating Systems

Green building rating systems are voluntary programs that help reduce the energy and environmental impact of commercial or residential buildings.

However, they become mandatory when adopted by authorities having jurisdiction over building construction. For example, California Gov. Arnold Schwarzenegger and Florida Gov. Charlie Crist have ordered that state buildings attain Silver and Platinum level certification, respectively, with the U.S. Green Building Council's LEED green building rating system. Other mandatory examples abound nationally, including the armed forces and federal agencies, which are huge landlords.

Whether mandatory or voluntary, green building rating programs clearly are stimulating the application of cool metal roofing. The USGBC LEED

environmental area of Sustainable Sites awards one credit point under heat island effect roofs for meeting the Solar Reflectance Index minimum of 29 for steep-slope roofs and 78 for low-slope roofs.

Energy and Atmosphere provides up to 19 points to optimize energy performance and cool roofing is recognized for its contribution. Another seven points are available for on-site renewable energy, with metal roofing being a superior platform for mounting photovoltaic panels and solar water heating. Other opportunities for points are found under Materials and Resources for building reuse, construction waste management, materi-

als reuse, and regional materials depending on the project specifics. Of course, metal roofing always contributes toward attaining two points with its recycled content.

Similar credits and points for cool metal roofing can be found within the Green Building Initiative's Green Globes green building rating system. Green Globes will soon finish its certification as an American National Standards Institute standard.

Energy Efficiency and Green Building Codes

The 2008 California Title 24 Building Energy Efficiency Standards, effective Jan. 1, 2010, is for building energy efficiency but it might be considered a green building code in that dimension. The Cool Metal Roofing Coalition worked with the California Energy Commission to help preserve cool metal roofing applications in all 16 of the California climate zones, either by meeting prescriptive requirements or demonstrating compliance through whole building design or trade-off analysis.

Other standards and codes speak to building energy efficiency, nationally and locally, including cool, or high albedo, roofing requirements. This is epitomized in the American Society of Heating, Refrigerating and Air Conditioning Engineers Inc.'s Standard 90.1-2007 Energy Standard for Buildings Except Low-Rise Residential. Under development is ASHRAE Standard 90.1-2010, which may have prescriptive requirements for low-slope cool roofs in climate zones one to three. It is expected to require three-year aged solar reflectance ≥ 0.55 and thermal emittance ≥ 0.75 . However, the new increased insulation requirements posed for this standard may reduce the benefit of cool roofing, especially as the relative cost effectiveness is evaluated.

But now, standard and code bodies are moving beyond building energy efficiency into more fully developed green building codes. They will not provide points like voluntary green building rating systems, but are obviously enforceable when adopted by states or municipalities. Several new green building codes are being ramped up which may rapidly and totally replace or perhaps complement current green building rating systems.

as a standard, its prescriptive requirements will be enforceable in locales where adopted. Currently, it provides for cool roofing in climate zones one to three, to meet the Solar Reflectance Index minimum of 29 for steep-slope roofs and 78 for low-slope roofs, or, must be listed by the EPA Energy Star Roofs Program as a qualified product.

Recently, another fast-moving green building code example is the International Green Construction Code now under development for traditional commercial and high-performance buildings. IGCC describes itself as "consistent and coordinated with the ICC family of codes and standards" and "designed with the leading rating systems in mind" as it "provides criteria to measure compliance." Only a few months into its fledgling draft existence, the IGCC should be monitored closely as its development unfolds, especially its adoptable nature and position relative to other green building rating systems and codes.

More Benefits and Green Incentives

Besides cool metal roofing being energy efficient and sustainable for green building rating systems as well as green codes and standards, its many practical basic benefits must be kept in mind, such as appearance, durability, being lightweight and resistant to the hazards of fire, wind, and seismic occurrences. The final green to consider is that of monetary savings afforded by cool metal roofing. Certainly, green savings accrue each month and year that cool metal roofing is in service for its owner. However, other green savings can come into play with the 2009 Stimulus Package, which offers a \$1,500 tax credit for installing a painted or coated Energy Star-labeled metal roof. Information on the tax credit can be found at www.coolmetalroofing.org/content/taxcredit. Other financial incentives can come from local utilities and states, as may be found through the Residential Energy Services Network, www.natresnet.org, or the Database of State Incentives for Renewables and Efficiency at www.dsireusa.org.

Whether voluntary, mandatory or monetary considerations are being observed, cool metal roofing is certainly looking up with what it has to offer. As building owners and architects increasingly see its beneficial role and compelling story, cool metal roofing will come out on top wherever there's a choice to be made for service and appearance. [MA](#)

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Category	Aged TSR	Aged TE	Min SRI	Climate Zones	Comments	Reference Sections
Non-Residential						
Steep Slope (new construction and alterations)	0.20	0.75	16	2-16	<5 lb/ft ²	143/149
Steep Slope (new construction and alterations)	0.15	0.75	10	1-16	≥ 5 lb/ft ²	143/149
Low Slope (new construction and alterations)	0.55	0.75	64	2-15	(1)	143/149
Residential						
Low Rise Steep Slope						
New Construction < 5 lb/ft ²	0.20	0.75	16	10-15	(2)	151
Alterations < 5 lb/ft ²	0.20	0.75	16	10-15	(3)	152
New Construction ≥ 5 lb/ft ²	0.15	0.75	10	1-16	(2)	151
Alterations ≥ 5 lb/ft ²	0.15	0.75	10	1-16	(3)	152
Low Rise Low Slope						
New Construction	0.55	0.75	64	13,15	(2)	151
Alterations	0.55	0.75	64	13,15	(4)	152
High Rise Low Slope (new construction and alterations)						
	0.55	0.75	64	10,11,13,14,15		143/149

COMMENTS:

(1) EXCEPTIONS: Metal building roofs in CZ 3 and 5 where U factor is ≤ 0.048 ; BIPV; roof > 25 lb/ft²; wood framed assemblies in CZ 3 & 5 where U factor is ≤ 0.039

(2) EXCEPTIONS: BIPV are exempt; roofs of ≥ 25 lb/ft² are exempt

(3) EQUIVALENCE: Insulation with a thermal resistance of at least 0.85 hr-ft²-°F/Btu or at least a 3/4" airspace is added to the roof deck over an attic; sealed ducts; 1/150 ventilation in zones 10,12,13; buildings with at least R-30 ceiling insulation; radiant barrier in the attic; ductless attic; R-3 minimum roof deck insulation above vented attic in CZ 10,11,13 and 14

(4) EXCEPTION: ductless attic

$$TSR_{aged} = [0.2 + 0.7(TSR_i - 0.2)]$$

With the California 2008 Standard being adopted, the metal roofing industry must be ready for the 2011 Revision Cycle. While infrared reflective pigments have greatly advanced the beneficial cool performance of metal roofing, new research steps can further document the role of above sheathing ventilation for cool metal roofing. Such projects with Oak Ridge National Laboratory, Oak Ridge, Tenn., and other partners will help cool metal roofing meet and exceed code requirements in California and other jurisdictions.

The prominent example is ASHRAE Proposed Standard 189.1P, Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings. Developed by ASHRAE, in partnership with USGBC, and the Illuminating Engineering Society of North America, it is in its fourth public review for ANSI certification. This standard is like LEED in many respects except it is written in code language for ready adoption by states and municipalities. It does not have a point system, but

Cool Metal Roofing Rated Products

Cool metal roofing rated products are provided by the EPA Energy Star Roof Product List at downloads.energystar.gov/bi/qplists/roofs_prod_list.xls and the Cool Roof Rating Council Rated Products Directory at www.coolroofs.org/products/search.php.