COOL METAL ROOFING
THE ENERGY-EFFICIENT CHOICE

EXTENSIVE THREE-YEAR PERFORMANCE COMPARISON STUDY SHOWS METAL ROOFS SAVE ENERGY

Cost-Effective Cool Metal Roofs Provide Continued Savings

In 2004, Oak Ridge National Laboratory's Buildings Technology Center completed its three-year performance comparison study to evaluate the energy efficiency and service life of metal roofing systems. Test fence data from ten, fifteen, and over thirty years of exposure were also evaluated.

The performance comparison study demonstrated that:

- After continued exposure to the elements, with more than thirty years for some samples, metal roofing remains the energy-efficient choice.
- Both painted and unpainted metal roofs show less effect from weather extremes over time, maintaining surface properties and resisting soiling.
- In some applications, energy savings from a painted metal roof (compared to a traditional built-up roof) can translate to significant cost savings, allowing the roof to pay for itself in as little as nine years. In other applications, roof payout is well within its projected 30 to 50-year life span.

The Study at a Glance

- Multiple-year, side-by-side study of roofing materials, including painted and unpainted metal roofing systems at ORNL, Oak Ridge, Tennessee and also test fence exposure sites in Florida, Nova Scotia and Pennsylvania.
- Continuous measurement of roof temperature and heat transmission.
- Periodic measurement of roof solar reflectivity and infrared emissivity (two factors that greatly affect a roof's energy efficiency).
- Impact evaluation of roofing materials on cooling use and peak demand.

Who Was Involved in the Study:

Oak Ridge National Laboratory's Buildings Technology Center conducted this roofing systems study in cooperation with the Cool Metal Roofing Coalition. Members include the American Iron and Steel Institute, Metal Building Manufacturers Association, Metal Construction Association, National Coil Coaters Association, and North American Zinc-Aluminum Coaters Association.

How the Study Was Conducted:

Sophisticated instruments, including a solar spectrum reflectometer and a portable emissometer, measured the ability of the roofing materials to reflect solar energy and emit heat. Periodic measurements showed how the performance of these materials changed over time.

The study compared various metal roofing materials in steep slope and low slope installations, including painted and unpainted galvanized steel, painted and unpainted Galvalume®-coated steel, and painted PVDF (polyvinylidene fluoride) aluminum roofing.

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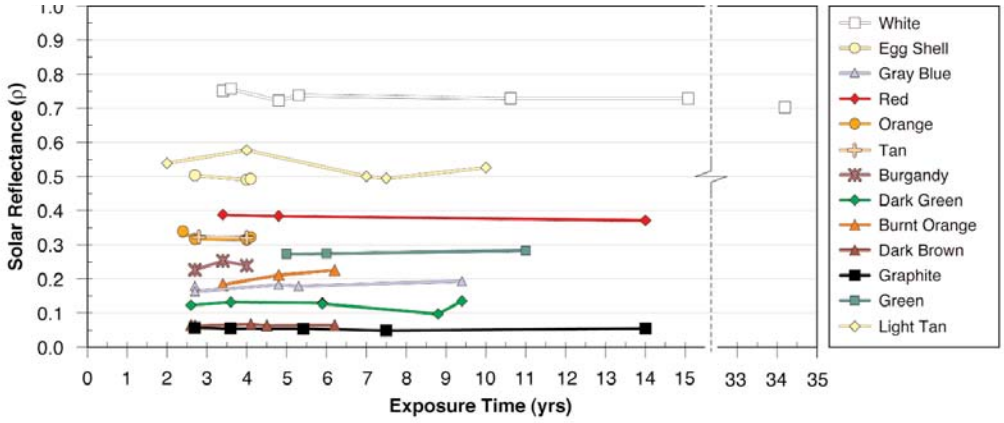
What the Study Showed:

• Metal panels maintain high levels of reflectance, as shown in the graph below, even after continued exposure to the elements over many years. The panels also maintained high levels of emittance which, in some cases, increased slightly.

• Both painted and unpainted metal panels maintain their energy efficiency better over time than any of the other roofing systems studied.

Solar reflectance of PVDF painted metals



What the Researchers Said:

"Based upon work done by Oak Ridge National Laboratory, pre-painted metal roofing retains 95% of its initial solar reflectance over a three-year period."

"The infrared emittance increases slightly as exposure time increases. The uniformity of emittance measured for exposure in different climates shows that the emittance of the painted metals is not affected by climate."

"All painted metal roofs have maintained their original manufactured appearance. After 3 1/2 years of exposure, rains with a measured pH of 4.3...have not etched the metal finish."

"The field data...show that these types of (PVDF) painted metals maintain their resistance to soiling for at least thirty-five years."

- Oak Ridge National Laboratory report,
"Exposure Testing of Painted PVDF Metal Roofing"

Want to Learn More?

For more about durable, energy-efficient cool metal roofing, visit www.coolmetalroofing.org. The ORNL report is under Education Materials.

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