New Ways of Defining Cool Roofs

The commercial roofing industry, and the regulatory agencies that oversee it, is likely to receive some fresh information this year that will require another look at what constitutes a "cool roof."

Currently, cool roofs comply with the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® roofing products standards. In addition, U.S. states (such as California, through its *Title 24 Energy Code [CEC]*) prescribe cool roofs as part of the base case building for nonresidential low-slope roofs. Both of these regulatory agencies cite solar reflectance as the metric to determine compliance.

By comparison, it's well known that the mass of a ballasted roof can also reduce peak roof temperatures and delay the heat flow into a building; however, since ballasted roofs don't meet the traditional requirements of high solar reflectance and high thermal emittance set out by the EPA and other organizations, they aren't officially recognized yet by the EPA as "cool roofs."

In March 2004, through side-by-side experiments, a study was initiated to see whether ballasted roofing systems offer energy-efficiency benefits similar to cool roofs. The study was conducted at the Roof Thermal Research Apparatus (RTRA) at the Oak Ridge National Laboratory (ORNL) for the Single Ply Roofing Industry (SPRI), in cooperation with the ORNL. Overseeing the project were André O. Desjarlais, Thomas W. Petrie, and Jerald A. Atchley, Building Envelopes Program, ORNL; Richard Gillenwater, Carlisle SynTec Inc.; and David Roodvoets, SPRI.

Different weightings of ballasted roofs were compared to a paver system and black and white membranes. These six test sections were monitored for thermal performance for a 24-month period.

Continuous monitoring of temperatures, heat flows, and weather conditions, as well as periodic verification of the surface properties of solar reflectance and thermal emittance, provided data to determine what impact a ballasted roof has on heat flow into a building and on roof-surface temperature. Furthermore, the monitoring allows for comparisons between the ballasted and unballasted membranes to assess whether ballasted systems perform as well as white membranes and are, therefore, deserving of "cool roof" status within the codes.

After collecting data for 100 uninterrupted weeks through April 2006, an interim report published by SPRI in September 2007 showed that the heaviest ballast and paver assemblies peaked in temperature at lower levels than the white membrane. The intermediate-weight assembly peaked at a temperature that's basically the same as the white membrane. At that point in the roof systems' lives, the white membrane was still above the ENERGY STAR minimum reflectance value of 0.65, indicating that the ballast systems were performing as cool roofs. (See the sidebar below for more information.)

In the future, some accommodations should be made to remove the market barriers that ballast roofs must overcome to be viewed in the same favorable light as cool roofs. Combining ballast with a proven, long-lasting, single-ply membrane will offer an effective option for environmentally conscious roofing professionals.

Mike DuCharme is chairman of the board of directors at the Bethesda, MD-based EPDM Roofing Association **(www.epdmroofs.org)**. *He also serves as marketing manager at Carlisle SynTec Inc., Carlisle, PA.*

More to Come on Cool Roofs

The final report from the Single Ply Roofing Industry study should be completed and approved in the next 6 months. Those findings will likely indicate that agencies, such as the U.S. Environmental Protection Agency (EPA) and California Energy Commission (CEC), need to reconsider the use of solar reflectance as the metric to determine compliance.

Based on the experimental work conducted in this ongoing study, ballast roofs performed in a manner equivalent to or better than the white membrane for a substantial portion of their service lives.