Setting the standard

By Brad Rowe

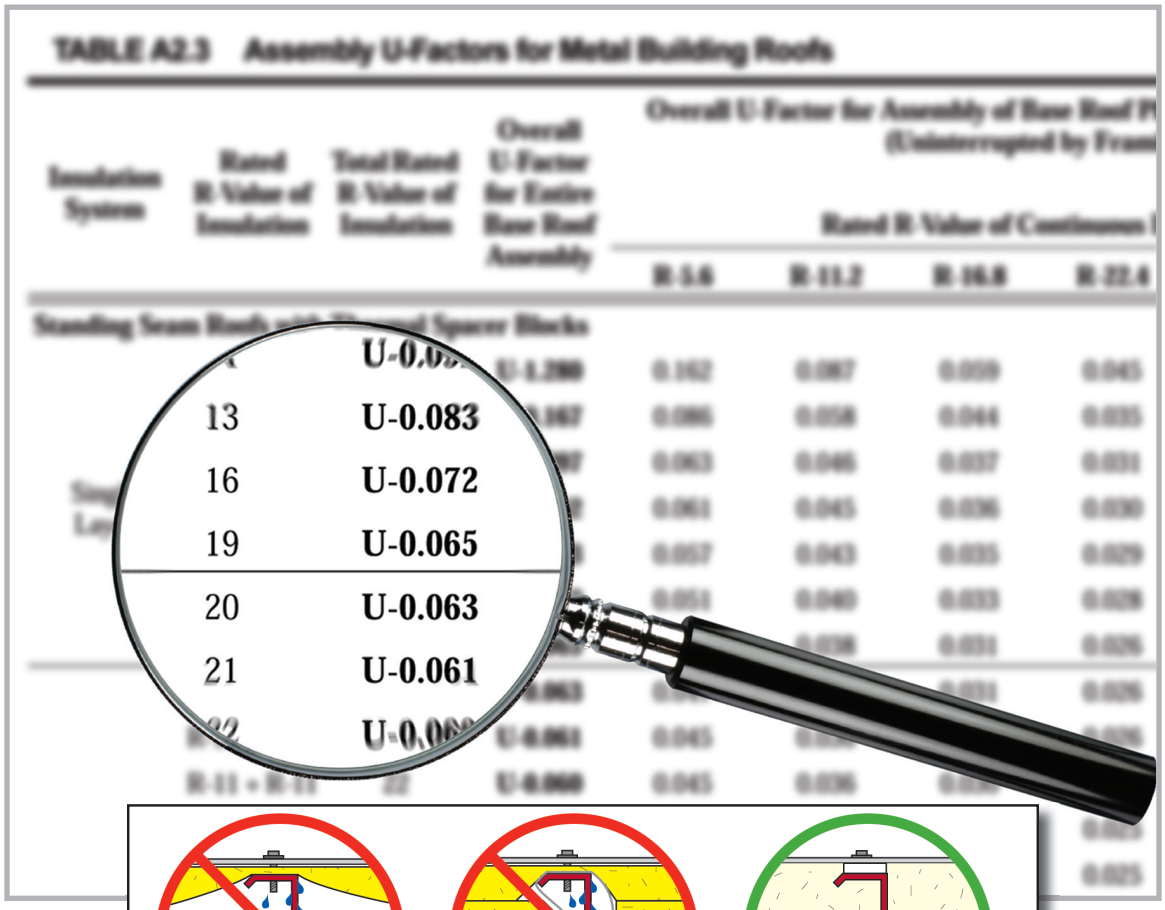
Performance values for metal building insulation assemblies have been the focus of recent code development cycles within the Atlanta-based American Society of Heating, Refrigeration and Air-Conditioning Engineers. As the metal building construction industry yields to market pressure for more energy-efficient buildings, ASHRAE has already made changes to the requirements in its next 90.1 Standard supplement for metal building roofs and walls.

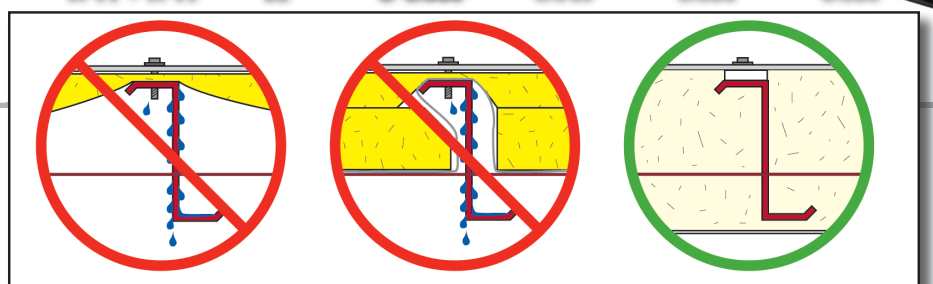
Coming Soon

The ASHRAE 90.1 Standard, "Energy Standard for Buildings Except Low-Rise Residential Buildings," typically is published every three years. The next set of guidelines, released as Standard 90.1-2010, is targeted to achieve a 30 percent energy savings compared to the 90.1-2004 Standard. One area that the building envelope committee is relying on to reach this goal is the envelope insulation requirements for metal building roofs and walls.

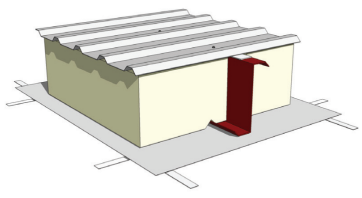
The realization of changes for metal building standards will become evident this fall when ASHRAE releases its 18-month supplement to 90.1-2007. There are a total of 16 approved addenda within this supplement, and one in particular that metal building contractors and designers must become familiar with: Addendum G. This addition increases the stringency for metal building roofs by lowering the U-factor by approximately 20 percent throughout climate zones two through eight for conditioned metal buildings in the United States.

ASHRAE is investigating the validity of the performance values for metal building insulation assemblies which have been incorporated into the 90.1 Standard since 1999.





Single- and double-layer over-the-purlin methods promote condensation and decreased insulation values by compressing the insulation between the purlins and roof sheets. In comparison, liner systems allow full insulation thickness (R-values) and encapsulate the purlins, countering condensation problems.



Thermal Design's Simple Saver System® is an example of a "Liner System" insulation assembly.

NEW INSULATION ASSEMBLIES FOR METAL BUILDING ROOFS LISTED IN ADDENDUM G		
Through-fastened Roof without thermal blocks	R-11 + R-19	U=0.044
Standing Seam Roof without thermal blocks	R-11 + R-19	U=0.040
Standing Seam Roof with thermal blocks	R-11 + R-19	U=0.035
Standing Seam Roof with thermal blocks	R-11 + R-25	U=0.031
Standing Seam Roof with thermal blocks	R-11 + R-30	U=0.029
Standing Seam Roof with thermal blocks	R-11 + R-11+ R-25	U=0.025

In With the New

Addendum G's requirements will go beyond the "traditional" method of insulating metal buildings. This method commonly uses single-layer fiberglass rolls installed perpendicularly over the purlins and girts, compressing the insulation when metal panels are installed. Addendum G expands the metal building roof assemblies listed in Table A2.3 "Assembly U-Factors for Metal Building Roofs" to include an assembly called "liner system." It showcases a total of six liner system assemblies for screw-down roofs and standing-seam roofs.

ASHRAE defines a liner system in Addendum G as follows: "A continuous vapor barrier liner is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the liner between the purlins. For multilayer installations, the first rated R-value of insulation is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached."

Although liner systems have been used in metal buildings for more than 25 years, this is the first time ASHRAE has incorporated them

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into the standard. Previously, the only metal building insulation assemblies and performance values in the standards were supplied and promoted by the Alexandria, Va.-based North American Insulation Manufacturers Association. These assemblies and values have been incorporated into each standard since the 90.1-1999 version. Each of the recently added liner system assemblies outperforms all the previous assemblies that NAIMA and ASHRAE have promoted. As an example, a standing-seam roof insulation assembly that incorporates a double-layer construction of R-19+R-19 supposedly provides a U-factor of U-0.046 with no hot box verification, whereas hot box tests for a liner system of R-11+R-19 provide a verified U-factor of U-0.035.

Liner systems are superior to the traditional methods of insulating because they address three crucial problems associated with over-the-top installation:

Insulation compression: Traditional methods compress the insulation, minimizing actual thermal performance.

Vapor retarder placement: Traditional metal building insulation methods do not isolate the highly conductive steel purlins and girts from the conditioned space. Improper placement outside the dew point line commonly results in condensation and corrosion problems.

Proper sealing of vapor retarder: Traditional metal building insulation methods require the installer to "seal" consecutive runs of laminated fiberglass rolls. This is commonly done by aligning, rolling and stapling the tabs together. It is not uncommon for the staples and joints to deteriorate over time, increasing the opportunity for heat transfer.

In addition to alleviating these three problems, a liner system assembly provides a clean, finished appearance, a higher acoustical performance and enhanced efficiency of the lighting systems. Liner systems can be installed from the topside or bottom during new construction and work extremely well when retrofitting existing buildings.

Don't Miss It

ASHRAE has been planning to make Addendum G available by this fall (as of press time). Despite adding liner systems to its tables to increase efficiency, it will continue to work toward achieving the 30 percent goal by evaluating more stringent envelope requirements for the 90.1-2010 Standard. MCN

Brad Rowe is the sales director for EnergyCraft Systems, Stoughton, Wis. He helps to provide installation, product and sales training for a network of certified insulation installers throughout the United States. He also is an active guest participant of the ASHRAE 90.1 Envelope Subcommittee. For more information, visit **www.energycraft.com.**