

Insulating Metal Buildings

Getting what you specified? Most don't!

By Brad Rowe

What if 95 percent of the metal buildings you have worked on the past dozen years performed 20 to 40 percent below actual insulation code intent? What if those building owners came back looking for an explanation and remedy?

This is a sobering realization for designers and contractors who have relied upon the industry method of insulating metal buildings by compressing a single layer of laminated fiberglass insulation over purlins and outside girts. It's been nearly two years since ASHRAE issued the press release with revised U-factors for these assemblies, which directly effects previous versions of Standard 90.1 dating all the way back to 90.1-1999. If your projects included insulating with a single layer of fiberglass and relied upon the ASHRAE published U-factors, industry published values and/or even COMCheck compliance program, it is extremely likely that the installed performance of thermal envelope is substantially lower than what was intended.

Fast forward to today when the building owner asks about the insulation in your proposed design. Even if you think you are meeting the requirements written in the energy code or you have used COMCheck to demonstrate compliance, in reality the design may be far short of actual code intended performance.

Learning more about different insulation methods for metal buildings has never been more important for yourself and your clients. Rigid board, spray foam, IMPs certainly have their advantages and have grown in popularity, but metal building fiberglass insulation still continues to be the popular and the most cost effective installed material for use in the industry. An effective fiberglass insulation design should first, require filling the purlin width and depth with uncompressed, full thickness fiberglass insulation installed between the purlins. Secondly, requiring a thermal break between the top of the purlin and the roof deck; this is commonly done with a layer of compressed fiberglass installed perpendicular to the purlins and incorporates a thermal spacer block for standing seam roofs. Finally and perhaps most importantly, is making sure the purlins and girts are not exposed to the conditioned space and to require proper vapor retarder and air barrier placement, which encapsulates all metal pur-

lins and girts. Using this fabric liner system design method reduces exposed conductive purlin and girt surface areas from about 40 to 50 percent to less than 1 percent of the roof and wall area making the cost per installed R-value for fabric liner systems extremely inexpensive compared to other products and methods when installed correctly.

VALUE ENGINEERING

Too often the term "value engineering" means reducing insulation levels to keep first costs down; which most times doesn't provide value and is certainly not engineering. Insulation has no moving parts, and if installed correctly should be worry and maintenance free. Alternatively, explore reallocating the investment and budget dollars towards properly insulating the building envelope, which may reduce HVAC equipment, curbs, labor and continuous maintenance costs on the equipment over the life of the building. The gas piping and electrical services alone can be significant collateral savings.

Partner with a knowledgeable insulation supplier that can help demonstrate these off setting first costs (equipment, lighting, finishing) and consider their envelope analysis which helps demonstrate the return on investment. For example, our company takes it one step further and works with designers and contractors to qualify their projects for energy efficiency incentives, such as rebates, grants and the attractive \$1.80-per-square-foot commercial building tax deduction outlined in our Synergy Design analysis. Improving the building envelope design and optimizing the installed insulation performance will return more value to the building owner than any other building material going into the project.


WATCH FOR THESE RED FLAGS

When learning and evaluating the different insulation options there are primarily two red flags to watch out for. The first is an absence of documented performance values and the second is lack of installation instructions for the product or method to achieve stated performance. Sellers of products that do not substantiate their performance claims "as typically installed" are essentially not making performance claims that can be relied upon when their product is actually used.

A prime example of this would be the debate of the installed performance of the "Filled Cavity" (i.e.,

Long Tab or Banded System) method. Increases in code stringency have industry companies and organizations scrambling to test something that achieves performance requirements. This would seem to be a positive development, however there is a key element that is being missed: practicality. At this point, there are no publicly available installation instructions on how to safely install this method to net the results of hot box testing. Insulation thickness, purlin bracing, framing interruptions and effective sealing techniques all affect how the insulation assembly will perform. Perhaps this is because it's not practical, nor is it safe to install and a high likelihood it's typically done in violation of OSHA regulations. What was tested? Can it even be practically installed as tested? Can it be installed while meeting safety regulations?

As a designer, you expect your design to perform as specified. If there is no documented assembly or method to install, how can performance values be relied upon? Tests should be at least be a representative sample of how the assembly is typically installed in buildings, rather than just an exercise for the lab which will not be replicated in the field.

High quality installation instructions, practical and achievable procedures, clearly defined safe installation practices, and a proven history and reputation of the product in actual uses should be evaluated in product selection and design considerations. All parties from insulation manufacturers to suppliers, to designers, including installers, must accept their responsibilities to achieve the installed performance of the product specified. So specify it, demand it, order it, install it, inspect it and reject it if it does not meet the specifications and expectations. If you don't, there is little chance it will perform as expected. Building owners, your clients, deserve nothing less. 

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The new addition to this building features a liner system whereas the older portion of the building originally incorporated a filled cavity system where the purlins are exposed and insulation thickness is limited by bracing and other obstructions within the purlin cavity.

