Liner system vs. filled cavity

The difference is substantial

This is in response to the article that was published in the September 2008 issue of Metal Builder *in which Charles Cottrell (NAIMA) discussed the importance of metal building insulation and specifically the insulation assemblies he referenced.*

Dear Renee,

I am in agreement with Charles Cottrell on the numerous benefits of metal building insulation that he discussed in his article such as condensation control, better acoustics and brighter interiors. However he was inaccurate in regards to the name of two of the double layer assemblies he shared with your readers.

I am specifically referring to the double layer system in which he called the "filled cavity" system. A "filled cavity" system is the same as a "long tab" system, however in his article he mistakenly described a "liner system" as a filled cavity system. The term "filled cavity" has appeared in the 90.1 Standard since the 1999 version and is clearly intended to represent a "long tab" assembly. The performance (U-value) and description for this assembly corresponds to NAIMA's own MB304 brochure and is clearly defined in the Metal Building Manufacturers Association 2006 Metal Building Systems Manual. Although there are some minor similarities comparing the two insulation assemblies, there are major differences between the two regarding construction, materials, installation, appearance, costs and most importantly performance.

Similarities

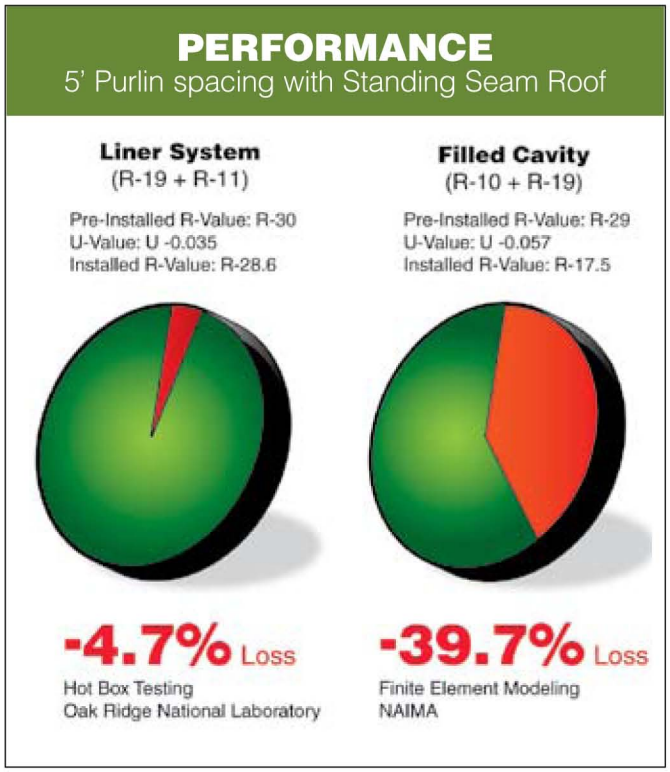
"Filled Cavity" and "Liner Systems" both utilize support structures such as steel bands installed below the purlins and are attached utilizing self drilling fasteners from the bottom side of the structure. Both insulation assemblies also commonly promote two layers of fiber glass insulation in which the first layer of fiber glass insulation is installed parallel with and between the purlins.

Differences

When using a "Liner System", a continuous flexible membrane (vapor retarder) is installed below and uninterrupted by the purlins and is held in place by the support bands. There is typically a dead space between the liner fabric and the bottom of the purlins. The liner fabric material creates a relatively uniform depth space which is needed for the first layer of unfaced insulation to rest upon. Blow in insulation can also be utilized in place of insulation blankets. With proper vapor retarder placement and isolating the highly conductive purlins, it reduces potential condensation problems and extends the life of the roof. It also provides a more finished ceiling appearance which offers excellent light reflectivity and excellent sound absorption.

Liner System (top) and Filled Cavity (above)

In contrast, when using a typical "Filled Cavity/Long Tab" assembly, the highly conductive purlins are left exposed to the interior of the conditioned space and there are typically uninsulated gaps along the purlins. Heat escapes in the winter through the exposed purlins, while in the summer, the exposed purlins conduct and radiate the roof absorbed heat into the building's interior. The purlins may be seasonally below the dew point which will lead to condensation, corrosion and a shortened roof life. The exposed purlins also are more prone to absorb light, collect dirt and cast shadows requiring unnecessary interior lighting. When comparing the performance of the two insulation assemblies, you will see the performance difference is substantial. Take a look at the example (page 7) comparing both assemblies utilizing a standing seam roof with a thermal block installed between the purlin and the



roof panel with purlins spaced five feet on center.

Although "Liner Systems" have been installed in metal buildings for more than 25 years, ASHRAE has now incorporated them into the 90.1 Standard. ASHRAE should release their 18 month supplement to 90.1-2007 Standard before the end of this year. Within this supplement, there is one approved addendum that pertains to metal building roofs — Addendum G. Previously, the only metal building insulation assemblies and performance values in the standard were supplied and promoted by NAIMA.

Each of the recently added liner systems outperform all of the previous assemblies that NAIMA and ASHRAE have published.

The liner system insulation assemblies are superior to the traditional methods of insulating because they address five crucial problems typically associated with over-the-top installations: creating space for insulation expansion, insulation compression, placement of vapor retarder, proper sealing of the vapor retarder joints and condensation control. n

Sincerely,
Brad Rowe, Thermal Design Inc.

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