Insulated Rooflines and Shingle Temperatures

Research from Florida shows that shingles don't get much hotter with spray foam insulation under the roof sheathing

By Allison A. Bailes III, PhD | July 3, 2013

Image 1 of 3 (Image Credit: akeg, from flickr.com)

Asphalt shingles on a roof with insulation at the roof deck and no ventilation are hotter than shingles on a vented attic. FSEC did a literature review of the research on the need for attic ventilation and found that shingle temperatures are slightly higher but lifetime is not much lower.

More Building Science

One of the most common questions I get when I describe homes with insulated rooflines is, “What does that do to the shingles?” Some roofing companies have made noise about this topic, saying that if the shingles can’t conduct heat downward into the attic, the shingle lifetime will be greatly reduced.

What’s the truth about this claim? How much does shingle temperature really rise if the insulation is right at the roofline and the attic isn’t vented? Fortunately, it’s easy to find out because the Florida Solar Energy Center (FSEC) put together a comprehensive literature review of the need for attic ventilation a few years ago.

Shingle Temperature On Homes with Insulated Rooflines

In the summer of 2000, FSEC researchers studied this issue themselves. (This experiment is described starting on page 24 of their review.) They looked at the shingle temperature for a set of houses that had insulation at the flat ceiling and a vented attic and for another set of houses that had insulation along the roofline. You can see the data in Fig. 11 below.

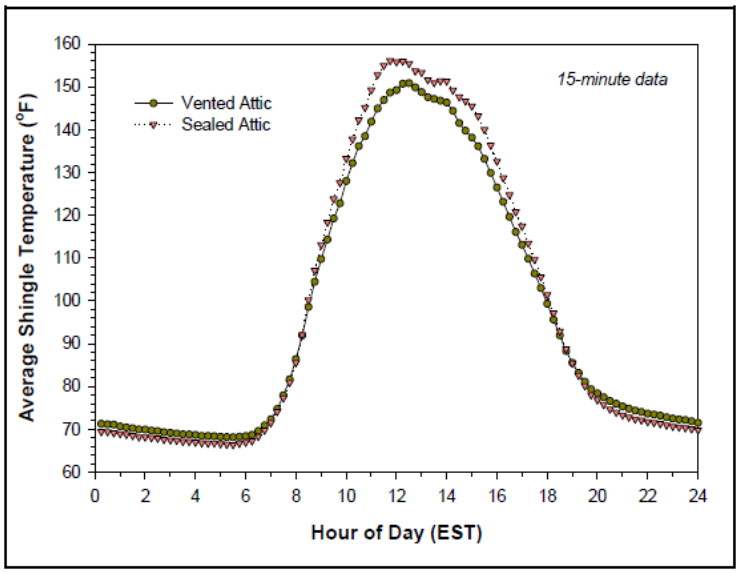

Figure 11. Data on 15-minute average shingle temperatures at FRF over the summer of 2000 in Cocoa, Florida.

As you can see, the temperature difference is only a few degrees. The graph in Fig. 12 below shows how the temperature difference between the two types of homes varied throughout the day.

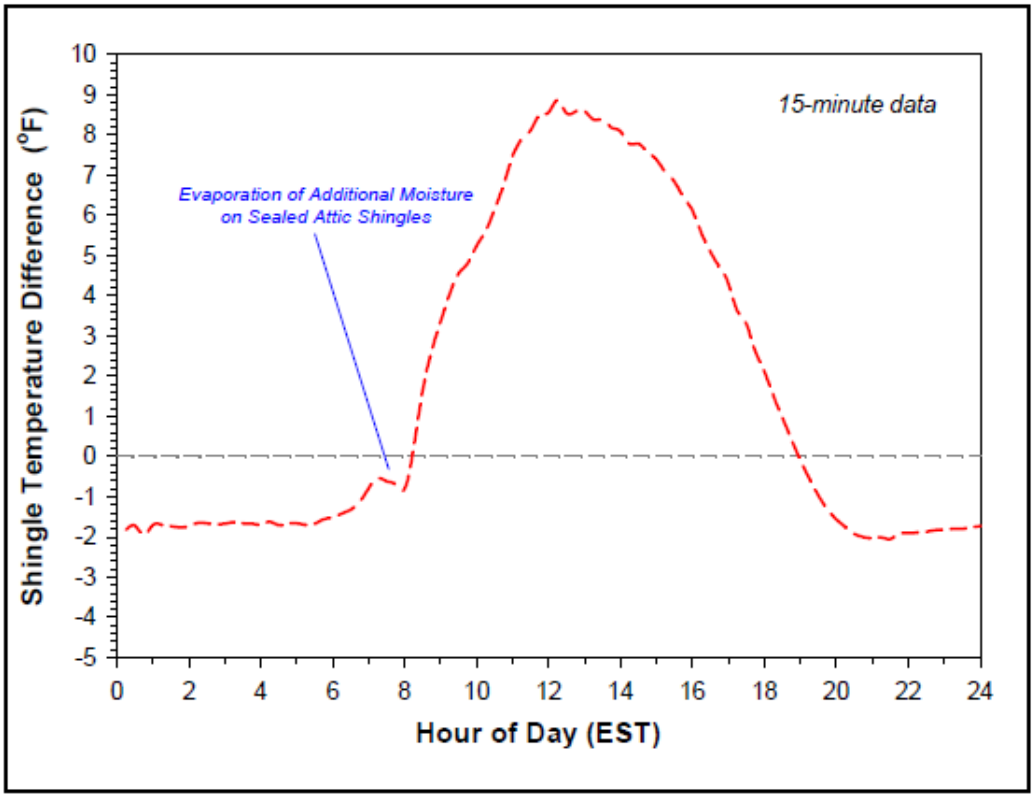

Figure 12. Plot showing the difference between shingle temperatures for a sealed vs. vented attic over the summer of 2000.

The largest temperature difference was about 9°F, which occurred around noon. The average temperature difference through the day was about 2°F.

Shingle Temperature And Durability

The paper covers a lot of ground, so here's a short list of some of the other research results on insulated rooflines, temperature, and durability.

- Shingle color and geographic location affect shingle temperature more than attic ventilation (p. 9).
- We don't know enough about the role of ultraviolet radiation (UV) in shingle durability.
- Homes with insulated rooflines have slightly higher shingle temperatures than roof decks with radiant barriers (7°F vs. 5°F).
- One study showed that shingle life is reduced by less than a year on homes in Miami with no attic ventilation. Another study showed a 2-year reduction.

Here's a bit of anecdotal evidence for you. Southface has a building constructed with structural insulated panels (SIPs) that they built in 1996. The asphalt shingles have been on the insulated roofline for 17 years now. They also have a detached garage with a vented attic. The last time I was there, I saw no difference in appearance or performance of the two roofs.

To end, let me ask you ask you a question: Do you know anyone who has ever collected on a shingle warranty? The answer is probably no. Even if it's yes, however, shingle warranties are structured so that you're not going to collect much if you do make a claim unless you have catastrophic failure in the first couple of years. An insulated roofline should have minimal effect, and almost certainly will not result in catastrophic failure if done properly.

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