

## **“THE EFFECT OF RADIANT BARRIERS IN AN ATTIC APPLICATION ON EXTERIOR ROOFING MATERIALS”**

The effect of attic radiant barriers on the temperatures of roofing materials is the subject of a recently completed RIMA-I study. Dark roofing material (shingles) can absorb as much as 95% of incident solar radiation and, as a result, will increase in temperature above the surrounding air temperature. The temperature reached by a roof in the heat of the day depends partly on the amount of heat transferred downward into the attic and conditioned space. The installation of an attic radiant barrier significantly decreases the amount of heat transferred in the downward direction with the result that the roof material temperatures will increase. The questions addressed by this bulletin are the magnitude of the temperature increase and the effect of the temperature increase on material warranties. The results of this study are:

- Roof shingle temperature increases due to attic radiant barriers are 2 to 5 degrees Fahrenheit.
- Roofing material warranties are not affected by the installation of attic radiant barriers.

Since 1989, The US Department of Energy has sponsored significant research relating to radiant barriers. In the early 1990s, many associations, networks, departments, and manufacturers have joined the search for more information on the effects and potential energy savings of attic radiant barriers. The Florida Solar Energy Center (FSEC) conducted a study on radiant barriers with no indication of damage to the roofing materials from the use of radiant barriers. This evaluation confirmed the energy-savings benefits of using radiant barriers in attics. The result of this study is a general consensus – properly installed radiant barriers, when used under shingles, do not void the warranty for the shingles.

If a radiant barrier system includes an enclosed air space, then there will be a thermal resistance (R-value) added to the thermal performance of the radiant barrier. Figure 1 shows three places where a radiant barrier may be installed in the attic. Attic radiant barriers must be in conformance with the following Industry standards:

- ASTM C 1313-00 Standard Specification for Sheet Radiant Barriers for Building Construction Applications
- ASTM C 1158-01 Standard Practice for use and Installation of Radiant Barrier Systems (RBS) in Building Construction

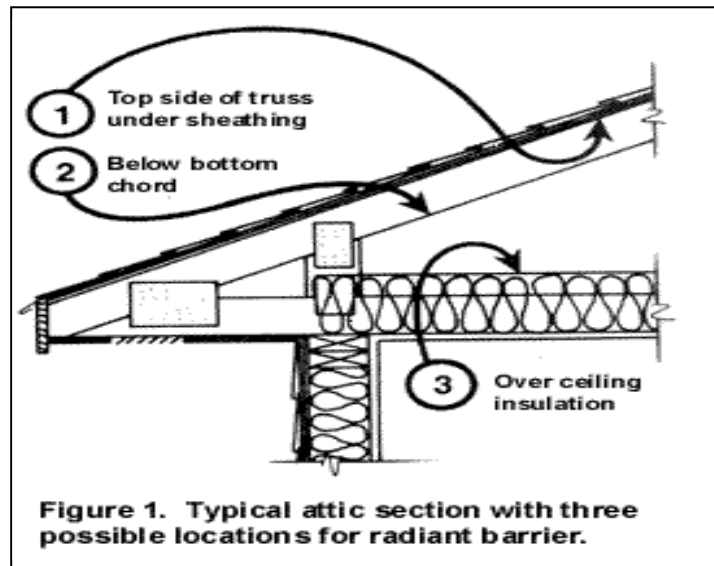


Figure 1

## Attic Radiant Barrier Applications

There is no reason to believe, or tests to prove otherwise, that radiant barriers will damage shingles. FSEC has measured the temperature of roof shingles above attic radiant barriers. The peak temperatures in hot weather were only 2-5 degrees Fahrenheit higher than the temperature of the same shingles without an attic radiant barrier. All of the research on this issue concludes that, the small increase in shingle temperature, resulting from installation of an attic radiant barrier, will not reduce shingle life nor alter, or void, the shingle manufacturer's warranty.

The following roofing material manufacturers have confirmed that their respective warranties would not be affected by the application of an attic radiant barrier.

- Elk
- GAF
- Celotex Corporation
- IKO Industries, Ltd.
- Vande Hey Raleigh
- US Intec
- Owens Corning
- CertainTeed Corporation
- Crane Plastics
- Atlas International, Inc.
- Louisiana Pacific, Inc.

## Testimonials

Ingrid Melody – Florida Solar Energy Center (2002)

“Shingle warranties should not be subject to cancellation by the manufacturer on the basis of radiant barrier installation. However, it may be wise to review the warranty to be sure that work of this nature will not void it.”

CertainTeed Corporation (28 August, 2001)

“In order for CertainTeed’s Limited Warranty to be in effect, the underside of the deck must be properly ventilated. In the case of the foil laminated directly to the deck material, the underside of the deck (below the foil surface) must be ventilated according to building code requirements (either minimum 1/150 or minimum 1/300). When loose radiant barrier sheets are used, the space formed in each roof rafter cavity, above the radiant barrier and below the roof deck, must have a through-ventilation from eaves to ridge.”

Paul Dunsbier – Manager, Technical Support, IKO Industries, Ltd. (1 February, 2002)

“We are not aware of any studies that confirm or refute [radiant barriers] usefulness regarding home heating and cooling applications. If the radiant barrier is applied above the insulation but below the ventilated air space, then the warranty should not be affected.”

Bob Vande Hey – General Manager, Vande Hey Raleigh (27 February, 2002)

“We have installed a lot of our concrete tile over reflective roof sheathing as far back as 1979. Thermo-Ply was covered on one side with a foil and worked well to reduce attic heat without affecting the tile performance... The concrete tiles weren’t affected by heat from the foil so we welcome a better foil underlayment...our 50-year concrete warranty is not affected by using a foil/reflective underlayment.”

Robert Weygant – Technical Service Rep., US Intec (26 February, 2002)

“Our warranties cover defects in manufacturing, not on installation, so the warranty itself cannot be voided. If someone were to install a radiant barrier beneath the shingles, the warranty against the manufacturing defects would still be in effect.”

Jane Byer – Crane Plastics (26 February, 2002)

“We do not have any issues with foil-faced underlayments as being applied under our products. Some vinyl siding manufacturers have concerns of heat build up that may cause ‘oil canning’ or warping of the product, but we have not had that experience. Therefore, at least to this point, we will fully warrant our products installed over these products with no additional limitations.”

Louisiana Pacific, Inc. (2002)

“Installation should not affect shingle life. LP has received statements from Elk, GAF, Celotex, Owens Corning, and CertainTeed that allow for the use of TechShield as roof decking without affecting their shingle performance as long as the shingles are installed according to the manufacturer’s installation instructions.”

**Note** - The shingle manufacturers shall not have any liability or responsibility for the following:

- Defects or damage caused by materials used as a roofing base over which the shingles are applied;

- Damage to the shingles caused by movement, settlement, distortion, deterioration, failure, or cracking of the roof deck;
- Premature deterioration of the shingles caused by excessive temperatures resulting from inadequate or improper ventilation;
- Defects or failure caused by application of shingles not in strict adherence with the installation instructions and/or local building codes.

## Conclusion

When properly installed, the use of radiant barriers with proper venting should not cause any damage to the roofing materials and will not void the warranty, since shingle warranties cover defects in manufacturing, not installation.

## Reference List

### Email

1. J. Byer (Personal Communication, February 26, 2002)
2. P. Dunsbier (Personal Communication, February 1, 2002)
3. B. Vande Hey (Personal Communication, February 26, 2002)
4. R. Weygant (Personal Communication, February 26, 2002)

### Documents

1. Certainteed Roofing Collection. Residential Roofing Technical Bulletin: Radiant Barriers (2001).
2. Florida Solar Energy Center. Radiant Barriers: A Question & Answer Primer (2002). Electronic References. Retrieved 5 February, 2002 from <http://www.fsec.ucf.edu/Pubs/EnergyNotes/EN-15.htm>
3. Louisiana Pacific FAQ (2002). Electronic References. Retrieved 25 February, 2002 from <http://www.lcorp.com/prod/techshield/product/faq.cfm#11>

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