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Department of Energy
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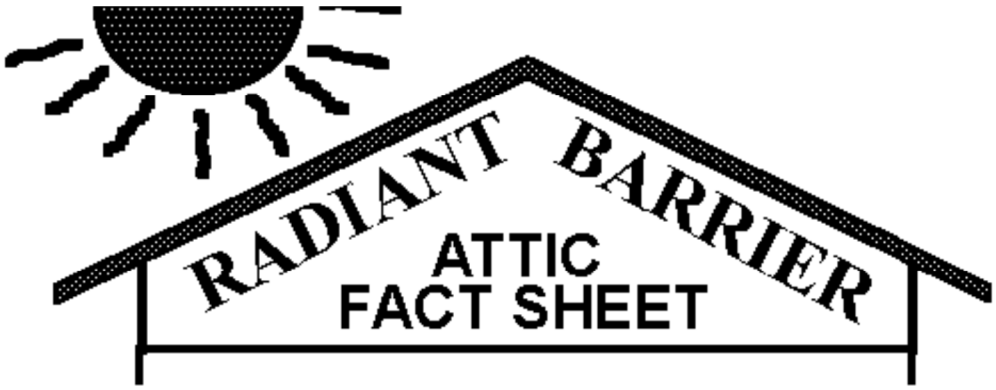

Contents:

Important Non-Energy Considerations

Potential for moisture condensation

Condensation of moisture can be a concern when a radiant barrier is installed on the attic floor directly on top of conventional insulation. During cold weather, water vapor from the interior of a house may move into the attic. In most cases, this water vapor will not cause any problem because attic ventilation will carry excess vapor away. During cold weather, a radiant barrier on top of the insulation could cause water vapor to condense on the barrier's underside.

Condensation of large amounts of water could lead to the following problems: 1) the existing insulation could become wet and lose some of its insulating value, 2) water spots could appear on the ceiling, and 3) under severe conditions, the ceiling framing could rot.

Some testing has been performed to determine the potential for moisture condensation with perforated radiant barriers laid on top of the insulation. A test was conducted during the winter near Knoxville, Tennessee, using houses that were operated at much higher-than-normal indoor relative humidities. Since this testing did not reveal any significant moisture condensation problems, it is expected that moisture condensation will not be a problem in climates warmer than that of Knoxville. Further testing of radiant barriers is needed to determine if moisture condensation is a problem in climates colder than that of Knoxville.

One precaution for preventing potential moisture problems is the use of perforated or naturally permeable radiant barriers. The higher the perm rating, the less potential for problems. Avoiding high indoor relative humidities, sealing cracks and air leaks in the ceiling, using a vapor retarder below the attic insulation, and providing for adequate attic ventilation are additional precautions.

Attic ventilation

Attic ventilation is an important consideration. With adequate ventilation,

radiant barriers will perform better in summer and excess water vapor will be removed in winter. Unfortunately, specific recommendations for the best type and amount of attic ventilation for use with radiant barriers are not available. Model building codes have established guidelines for the amount of attic ventilation area per square foot of attic floor area to minimize the occurrence of condensation. These guidelines specify one square foot of net free ventilation area for each 150 square feet of attic floor area. This ratio may be reduced to 1 to 300 if a ceiling vapor retarder is present or if high (for example, ridge or gable vents) **and** low (soffit vents) attic ventilation is used. Since part of the vent area is blocked by meshes or louvers, the net free area of a vent is smaller than its overall dimensions.

Effect of radiant barriers on roof temperatures

Field tests have shown that radiant barriers can cause a small increase in roof temperatures. Roof mounted radiant barriers may increase shingle temperatures by 2 to 10^{o}F, while radiant barriers on the attic floor may cause smaller increases of 2F or less. The effects of these increased temperatures on roof life, if any, are not known.

Fire ratings

The fire ratings of radiant barriers are important because flame and smoke characteristics of materials exposed to ambient air are critical.

> **TO MEET CODE, A RADIANT BARRIER MUST BE RATED EITHER CLASS A BY THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) OR CLASS I BY THE UNIFORM BUILDING CODE (UBC).**

To obtain these ratings, a material must have an ASTM E-84 Flame Spread Index of 25 or less and a Smoke Developed Index of 450 or less. Look for these ratings either printed on the product, or listed on material data sheets provided by the manufacturer.

Previous Section - Effect of Radiant Barriers on Heating and Cooling BIlls
Next Section - Installation Procedure

Building Envelope Research
Oak Ridge National Laboratory

For more information, contact the program manager for Building Envelope Research:

André O. Desjarlais
Oak Ridge National Laboratory
P. O. Box 2008, MS 6070
Oak Ridge, TN 37831-6070

E-mail Andre Desjarlais