

## Radiant Shield FAQ

Two-sided Radiant Barrier

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### Why the shift to perforated Hi-Perm products?

As building envelopes are getting tighter, building scientists, energy centers and research organizations are suggesting that insulation products and facings used in hot humid climates have higher perm ratings for increased water vapor transmission. Fi-Foil's Hi-Perm versions are designed to meet or exceed these recommendations.

### Is a vapor retarder an essential part of an insulation solution?

A water vapor retarder may or may not be part of the design depending on the climate zone and the other building components used in that particular section of the building envelope. If air containing water vapor is allowed to come in contact with a cold surface, then condensation will likely occur. Water vapor transmission can also occur even if the building envelope is air sealed or has an effective and properly installed air barrier. Some insulation systems should include a water vapor retarder and some should allow vapor transmission. Building codes and climate zones generally dictate the use of a water vapor retarder -- in short, the envelope is a system and the use should be carefully considered by the building designer.

### What are the conditions that will make condensation occur on the underside of an un-insulated metal roof deck or framing members?

Condensation will occur on any surface when the temperature of the surface is at or below the "dew-point temperature" for an air-water mixture. The dew-point temperature depends on the dry-bulb temperature (measured with an ordinary thermometer) and the relative humidity in the space next to the surface. The dew-point temperature is less than or equal to the dry-bulb temperature. The two temperatures are equal when the relative humidity is 100%. Some examples of dew-point temperature:

Temperature	Relative Humidity	Dew Point
70 °F	50%	50.5 1/4F
70 °F	75%	66.6 1/4F
70 °F	90%	66.9 1/4F

As you can see, condensation can occur when the outside temperature is cold. Insulation below a roof deck will have an inside surface temperature that is above the roof surface temperature. The actual temperature of the inside surface depends on the amount of thermal resistance between the roof and the inside surface. The higher the resistance, the closer the interior surface temperature will be to the inside air temperature. Maintaining a reasonable inside relative humidity (less than 60%) is an important factor in preventing condensation.

### Why should I install radiant barrier in unconditioned areas like the garage, patio and patio areas?

Heat radiates through the roof, and areas unprotected by the radiant barrier will allow heat to transfer to other areas of the house. Installing a radiant barrier in all areas of the house not only improves overall performance, but also increases comfort levels in unconditioned areas like garages and patios.

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### Can radiant barrier be installed at a later time, after the building is completed?

Yes, but it is a lot more costly due to labor. The time to consider it is in the new construction phase. There are many other energy upgrades, such as additional blown or batt insulation that can be easily added at a later date if current budget is a factor.

### Does radiant barrier attic application require ventilation, and if so, what type (ridge, off-ridge, soffit, etc.)?

No, they work with or without ventilation but will perform better in ventilated attics. According to the building code, all attics in Florida must be vented.

Extended Version: Studies have shown that with or without a radiant barrier, a ventilated attic is best and the same holds true for a radiant barrier. A house will perform better with a radiant barrier and a ventilated attic than a house with a radiant barrier and a non-ventilated attic. Houses must be designed to meet the building code, which has ventilation requirements with or without a radiant barrier. In both cases, it is the ventilation rate that is important, not the method or type of ventilation.

### Will your radiant barrier work as efficiently in winter as it does in summer?

Radiant barriers reduce heat gain (in the summer) and heat loss (in the winter), so it will benefit both winter and summer savings and comfort. In the summer, heat is reflected back to the outside and in the winter, heat is reflected inwards.

### Will a radiant barrier decrease the life of roofing shingles?

Various studies including those conducted by the Florida Solar Energy Center have concluded that it would be highly unlikely. In the Sunbelt and specifically Florida, shingles are exposed to roof temperatures of 160 to 190 degrees. Studies have proven that radiant barriers only increase roof temperatures by 2 - 5 degrees. A few degrees more won't make a difference.

### What is the best choice to upgrade energy efficiency, a radiant barrier or additional insulation?

To best increase your energy efficiency, you should deal with the problem at its source, the roof, and the best way to address it is by adding a radiant barrier. A radiant barrier is specifically designed for this application and will reduce heat transfer up to 97%. The radiant barrier will improve the performance of both the air conditioning ductwork and the mass insulation and will improve comfort in garages and patios, areas that are typically not conditioned. Studies have shown that the radiant barrier / mass insulation combination out-performs mass insulation alone. Silver Shield Radiant Barrier is installed just below the roof sheathing. The idea is to stop the heat right at the source, the roof, before it gets into the attic or building envelope. Standard mass insulation is almost always installed on the surface of the ceiling, and air conditioning duct systems are almost always installed in the attic space. So without a radiant barrier, the heat would build-up in the attic and reach extreme temperatures, upwards of 140 degrees. Think about it, does it make sense to pump 55-degree air through ducts running through a super-heated attic? And does it make sense to expose insulation to extreme temperatures when the R-value rating is determined at 75 degrees, with the knowledge that the R-value rating drops as the temperature increases? No, of course not! Why let the heat get in the attic in the first place? To summarize, adding a radiant barrier simply provides more benefits over adding more insulation (cooler attic, improvement in duct performance, improvement in ceiling insulation performance, more comfortable areas of the home that are typically not insulated like the garage and patio). If you have extra money in your energy budget, do both; however, the order is radiant barrier first, more ceiling insulation second.

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### Why do I need a radiant barrier and how does a radiant barrier work?

In a home without a radiant barrier at the roofline, your roof radiates solar-generated heat, which elevates attic temperatures upward to 150 degrees or higher. These higher temperatures will increase the heat gain in air conditioning ducts and reduce the performance of mass insulation (the R-values of mass insulation are determined at 75 degrees F - higher temperatures lower the R-value). In addition, the extreme temperatures will saturate the building materials in the attic. This stored heat acts as a heat sink and will continue to transfer heat into the living area of a home even after the sun has set, making the air conditioner run longer and consume more electricity. A radiant barrier stops 97% of radiant heat transfer, which improves the performance of insulating materials and lowers attic temperatures as much as 30 degrees F. A cooler attic will transfer less heat into your air conditioning ducts. Radiant barriers lower both cooling and heating costs, reducing energy expenditures throughout the year.

### What is a radiant barrier?

A radiant barrier is a product that features a low emittance surface(s) (normally aluminum foil) that is designed to significantly reduce heat transfer between a very hot and high radiating surface (bottom of a roof deck) and a cooler highly absorbent surface (i.e. insulation on top of a ceiling). Multiple low emittance surfaces, even multiple layers with enclosed air spaces, can further reduce radiant heat transfer. Effective emittance is one term that can quantify the impact of the impact of the additional surfaces. In summary, the lower the emittance (radiation rate), the better the performance. Radiant barriers have been demonstrated to achieve significant energy savings in a wide variety of building types and in multiple climate zones.

### What can I do when I have a weak cell phone signal in my home which has a radiant barrier installed?

Purchase one of the following products to boost your cell phone signal:

- From Verizon Wireless - 3G Newtwork Extender (cost is approximately \$249.00).
- From AT&T Wireless - 3G MicroCell (cost is approximately \$200.00).

Please understand there can be a variety of reasons for a weak cell phone signal, and the products above were recommended by the two top cell phone service providers.

### Is the calculated R-value based on the ASHRAE Fundamentals Handbook?

Yes. The ASHRAE Handbook values are a subset of data from the National Bureau of Standards (NBS).

### Do you need a radiant barrier in the attic if you have a silver galv-alum or white metal roof?

These roofs are excellent reflectors of solar reflectance when new but over-time, as they age and get dirty, the reflectivity is lowered. Radiant barriers would still reduce whatever heat flow that penetrates the roof surfaces by the same percentage - there is just less heat coming through these types of metal roofing materials vs. a shingle roof. As the metal roof ages, and the metal reflects less solar radiation, the radiant barrier has a greater impact on energy savings.

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