Spray-applied radiant barriers

A new generation of energy-saving radiant barriers can be sprayed on the underside of the roof deck or on the roof surface.

By William T. Guiney

Keeping a building cool through the use of a reflective insulation or a radiant barrier system under the roof has been shown to be an effective method for reducing interior temperatures and for lowering air conditioning loads. Now this same technology can be employed on rooftops using recently developed spray-applied radiant barriers.

Radiant barriers, when applied to the inside of an attic or interior walls of a building, work by blocking the heat radiating into the building from the hot roof and sidewalls.

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The heat gained from the exterior surfaces exposed to solar radiation is transferred to the interior building components, such as floors and insulation, by infrared radiation. Most interior building components, such as wood, drywall and insulation systems are good absorbers of this infrared radiation.

The result of using radiant barriers for blocking infrared radiation is cooler interior spaces and insulation systems that can perform more effectively.

Typically, laminated aluminum foils or aluminized plastic films have been the most prevalent radiant barrier products available. Now, a unique spray-applied low emissivity paint, LO/MIT-1, is available and is proving to be almost as effective on interior surfaces as traditional radiant barriers. It can also be used on exterior surfaces, where it is almost impossible to use foil or plastic products.

Application techniques

Interior foil radiant barriers can be installed directly on the underside of the roof deck, draped over the top of the trusses before the deck is put in place, or stapled to the underside of the top truss chord.

The spray-applied radiant barriers are sprayed directly on the underside of the roof deck, lowering the ability of the wood deck to emit radiant heat to the inside of the building.

The Reflective Insulation Manufacturers Association recommends that perforated or non-perforated radiant barriers not be applied directly on top of existing insulation on the attic floor. This application method could lead to moisture entrapment below the radiant barrier, and it has been proven that dust accumulation on an upward facing radiant barrier surface will degrade its performance.

Many contractors have questioned whether radiant barriers shorten roof life by increasing the temperatures of the roofing materials. Tests at the Florida Solar Energy Center have shown an increase in roof skin temperatures of less than two degrees Fahrenheit when radiant barriers are used in the attic space.

Thus, radiant barriers should not have any effect on the roof’s longevity. These same tests also showed a 20 degree temperature reduction at the insulation level, verifying how effective radiant barriers are in reducing air conditioning loads.

The development of spray-applied radiant barriers will provide roofing contractors with many more attractive options he can choose from.

For example, garage or warehouse doors, cathedral ceilings, overhangs where foil applications are not practical can now be provided with a radiant barrier that is easy to install and maintain.

Many contractors who had not used radiant barriers in the past are now using the spray-applied technology. In fact, the spray-applied radiant barrier has been proven so effective that it has recently been installed at the NAHB Research Center in the new Lifestyle 2000 Home.

In many commercial buildings, a foil radiant barrier system may be somewhat costly and difficult to install. In these applications, the spray-applied radiant barrier will provide a practical interior application. And because of the radiant barrier’s high reflectivity, it will also act as a light reflector, possibly lowering interior lighting requirements and associated cooling loads.

Roofs that save energy

The benefits of using roof coatings have been well documented in recent
years. Now it is possible to have the protective benefits of a roof coating and the energy conservation benefits of a radiant barrier by using spray-applied radiant barriers, such as LO/MIT-1, on exterior roof surfaces.

Radiant barrier coatings are significantly different from many other roof coatings. Though most roof coatings are fairly reflective to sunlight, they are not always good reflectors of infrared radiation (the portion of the solar spectrum that creates most of the heat).

As an example, LO/MIT-1 has an emissivity of .24 on smooth roof surfaces such as metal, EPDM and other single-ply systems, according to the manufacturer, Solar Energy Corporation, Princeton, NJ.

This means that it reflects 76 percent of the incoming infrared radiation. Most standard roof coatings will reflect, at best, only 20 percent of the incoming infrared radiation. Visible light reflection for both the radiant barrier coatings and the standard roof coatings is generally 85 percent or higher.

Because of their low emissivity, radiant barriers coatings tend to keep roof surfaces up to 10 degrees cooler than standard roof coatings. In addition, they are unaffected by U.V. radiation, temperature-tolerant from -100° F to over 1000° F, and extremely flexible.

Using a radiant barrier coating will protect a roof surface from U.V. and greatly extend its longevity by reducing expansion and contraction. In the summer, thermal shock due to afternoon rain showers will be greatly reduced through the use of a radiant barrier roof coating. By lowering the ability of the roof surface to emit or radiate heat, the roof surfaces are generally cooler during the heating season. This means the building is subject to less heat loss and experiences reduced heating loads.

In areas of moderate to heavy snowfalls, snow will tend to stay on the roof surfaces coated with a radiant barrier longer. As long as outside ambient temperatures are below 32°F, snow acts as an excellent insulator, especially when it is light and fluffy, adding to the insulation value of the roof assembly.

Radiant barrier coatings are a low cost method of lowering air conditioning loads, increasing roof system longevity and possibly saving on heating costs. This new technology will expand the options of the roofing contractor when selecting a roof coating.

**Residential opportunities**

Radiant barrier roof coating systems can be used on practically all roof systems. As an example, in July, 1988, a single-family residence located in South Florida had a radiant barrier roof coating applied on a gray fiber-glass/asphalt shingle roof. The energy consumption and temperature data for the year prior to, and the year after the installation date was compared.

Even though the cooling degree days had increased 12 percent during the year when the radiant barrier roof coating was installed, the energy consumption or total usage decreased over 10 percent, proving how effectively radiant barrier roof coatings can conserve energy.

The Florida Energy Efficient Building Code and many utilities nationwide are promoting the use of radiant barrier systems in new construction and retrofit as a method to conserve energy. Reflective roof coating programs will see additional benefits when using radiant barrier coatings.

It is entirely possible that in the near future all new homes and commercial buildings will include some type of radiant barrier system as more contractors and consumers become aware of this inexpensive and practical method to reduce energy costs while improving interior comfort.

Now, spray-applied radiant barriers can offer the advantages of this unique technology both inside and outside of the structure. **RSI**

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