

Reflective insulations - What contractors should know about coatings and barriers
May 1, 2006
Roofing/Siding/Insulation (RSI)

The key to maintaining a comfortable temperature in a building is to reduce the heat transfer out of the building in the winter and reduce heat transfer into the building in the summer. Heat is transmitted across confined air spaces by radiation, convection, and conduction. The goal is to reduce heating and cooling loads.



Reflective insulation, radiant control coatings, and radiant barriers are products that perform this function by reducing radiant heat transfer, thereby reducing heating and cooling requirements. To better understand what each of these products do, let's define them.

Reflective insulation uses layers of aluminum, paper, and/or plastic to trap air and thus reduce convective heat transfer. The aluminum component, however, is effective in reducing radiant heat transfer. In fact, the metalized and foil materials commonly used in reflective insulation will reduce radiant heat transfer by as much as 97%.

Reflective insulation is a thermal insulation consisting of one or more low emittance surfaces, bounding one or more enclosed air spaces. Standard types of insulation, such as fiberglass, foam, and cellulose primarily reduce heat transfer by trapping air or some type of a gas. Thus, these products or technologies reduce convection as a primary method of reducing heat transfer. They are not as effective in reducing radiant heat transfer, which is often a primary mode of heat transfer in a building envelope. In fact, these products, like most building materials, have high radiant transfer rates.

In other words, the surfaces of standard types of insulation are good radiators of heat. Reflective insulation uses layers of aluminum, paper, and/or plastic to trap air and thus reduce convective heat transfer. The aluminum component, however, is effective in reducing radiant heat transfer. In fact, the metalized and foil materials commonly used in reflective insulation will reduce radiant heat transfer by as much as 97%.

A *radiant barrier* is a reflective/low-emittance surface, as defined by ASTM, where the emittance is 0.10 or less on or near a building component that intercepts the flow of radiant energy to and from the building component.

The aluminum foil shields commonly inserted behind radiators in older houses are radiant barriers, blocking radiant heat transfer from the radiator to the exterior wall. It should be clearly understood that although a radiant barrier reduces heat loss and gain through the building envelope because it is installed in vented cavities (like attics), it is not an insulation material per se and has no inherent R-value.

As characterized by ASTM, an *Interior Radiation Control Coating* (IRCC) is a non-thickness dependent, low emittance coating. When applied to non-porous building materials such as plywood, OSB, metal siding or plasterboard, according to the manufacturer's installation instructions, it decreases the normal surface emittance of these materials to 0.24 or less.

An IRCC works by changing the emittance of the surface where it is applied. Building products, such as wood, brick, painted surfaces and plasterboard exhibit high emissivities (0.7 - 0.95). When heated above the temperature of adjacent surfaces, they radiate most of their heat energy to cooler surfaces.

An IRCC works by lowering their surface emittance to 0.24 or lower, lessening their ability to radiate heat. An IRCC is similar to a Radiant Barrier System (RBS) but is somewhat less efficient due to its higher emissivity and is comprised of a coating on a building surface, not a foil or film product.

By definition, some of the benefits of reflective products are evident. But you should also know that reflective insulation and radiant barriers come in a variety of configurations. The most commonly used in the commercial metal building industry are the "bubble foil" products and other structures that incorporate polyethylene or polypropylene foams as the substrate, with aluminum foil on one or both sides. The total structures are usually 5/16th inch or less thick.

Their virtue lies in their ease of installation, competitive prices, variety of sizes, and availability. Additionally, they are excellent vapor barriers and good remedies for condensation problems. Many building manufacturers and distributors offer reflective insulation with their building packages.

Reflective insulation and radiant barriers meet Federal Trade Commission 460 guidelines and meet ASTM standards for testing and installation methods. Many manufacturers have reflective materials that have ICBO, BOCA, and SBCCI code body approvals.

Reflective products, depending on the application, could also qualify for LEED (Leadership in Energy and Environmental Design) credits. The strongest factor is that the thermal efficiency of reflective insulation saves energy, which in turn contributes to a reduction in electrical load requirements. Reduced load requirements, in turn, may allow smaller mechanical units, which results in less energy demand.

From a LEED perspective, energy savings over the sustainable life of a building can be significant when using reflective thermal insulation in all appropriate wall, ceiling, floor and roof applications. This can be a cost-effective solution for increasing insulation efficiency and reducing the energy load on mechanical equipment.

Also, a significant amount of the primary materials used in the production of reflective insulation and radiant barrier components—specifically, aluminum foil, kraft paper and plastic—can be derived from post-consumer recycled materials, thus conserving several natural resources. The products are also much lighter in weight than most construction materials, which saves energy and other environmentally related costs involved in shipping and handling.

There are many different reflective products on the market today, and it has become the contractor's responsibility to educate themselves on these products so that they can make sure what they are purchasing will do its job properly.

One way to do that is to obtain test data from the manufacturer and to make sure the data provided is for the product you are considering purchasing.

In closing, if reflectives are new to you, plan to try them out this year. You will be doing your part to reduce energy consumption in your community, create a new profit center for your business, and gain more satisfied customers.