

“Reflective Insulation and Metal Buildings”

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Submitted by: Reflective Insulation Manufacturers Association (RIMA)

Reflective technology has made product selection for metal buildings effortless. Heat travels through wall spaces or between roofs and attic floors by radiation, conduction, and convection with radiation the dominant means of heat transfer across open spaces. Reflective insulation is an efficient barrier against radiant heat transfer as it reflects nearly all of the infrared waves striking its surface and emits very little of the heat conducted through it. The physical properties of reflective insulation also reduce convective heat transfer. Mass insulation including fiberglass, cellulose, or rock wool, mainly slow heat flow by preventing convection and reducing some radiation. Reflective foil insulation provides a dramatic reduction in radiation heat flow as well as some convection.

Different types of insulation products reduce the heat transferred by conduction, convection and radiation to varying degrees. As a result, each provides different thermal performance and corresponding R-values. The primary function of reflective insulation is to reduce radiant heat transfer across open spaces, which is a significant contributor to heat gain in summer and heat loss in winter.

The difference in installing reflective insulation and traditional insulations is illustrated by the fact that a reflective insulation needs an airspace to work. The best way to achieve this airspace in new construction of a metal building is by creating or using a thermal break. Installed properly, the low emittance of the aluminum surface will block between 95 - 97% of the radiation which is a significant part of the heat transfer.

Roof assemblies consisting of a corrugated metal exterior, ½ inch thick extruded polystyrene thermal breaks positioned five-feet on center, reflective insulation, and eight-inch Z purlins have produced excellent thermal values when properly installed. The R-Values for this assembly are about 3.6 for heat flow up and 7.3 for heat flow down. These R-Values include air-film thermal resistances of 1.32 for heat flow up and 4.55 for heat flow down associated with low emittance bounding surfaces.

When foil insulation is installed properly in a wall assembly consisting of a corrugated metal exterior, ½ inch thick extruded polystyrene thermal breaks, reflective insulation, eight inch Z girts, and ½ inch thick wafer board to represent an interior finished wall an R-Value of 4.50 is achieved. This figure includes a thermal resistance of 1.70 for the surface air film.

Traditional insulations are typically applied directly to the roof deck. When they are applied compression occurs and if vapor tight seams are present condensation has been known to form. Condensation caused by high humidity, can cause corrosion, decreased thermal performance, possible fungal growth, extra labor and added material expense. Reflective insulations, applied with a thermal break to prevent metal-to-metal thermal bridging, inhibits condensation problems by keeping the exposed insulation surface above dew point. Other benefits to installing reflective insulations include:

- Mildew resistant
- Thermal performance
- Easy to install
- Safe, clean & environmentally friendly

- Resists rodents and nesting
- Vapor retarder
- Improved lighting
- Reflective insulations compliment radiant floor systems to provide wall-to-wall comfort.

There's no doubt reflective foil insulations are one of the most versatile insulations on the market today. Contractors, architects and specifiers alike will benefit from utilizing foil in their next metal building project. Reflective foil insulations are also recommended for crawl spaces, attics, post frame, plumbing, HVAC, radiant floor heating applications, and many, many more.

RIMA represents reflective insulation and radiant barrier manufacturers and other companies that are active within the industry. RIMA exists to publicize the benefits of reflective insulation technologies, participate in the development of appropriate codes and standards, and serve as a focal point for information and promotion of reflective insulation, radiant barriers, and low-emittance coatings. RIMA invites you to explore their website at www.rima.net for additional information.