

A tale of two seasons

Cool Roofing in Cool Climates

Does a Cool Roof make sense in places like Minnesota and Chicago? How much heat does an EPDM or a dark colored roof absorb in the winter and what is the heating benefit?

The pictures below are of an industrial roof in Minneapolis. The roof is insulated and has two different roofing systems installed side by side. The first roof is a fully adhered EPDM rubber (black). The second roof is mechanically fastened Perma-weld PVC membrane.

winter

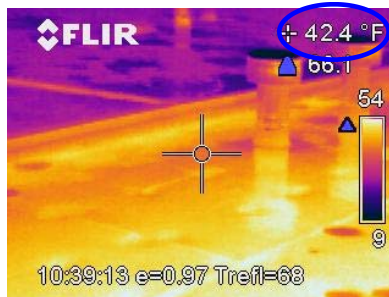
On December 15 thermal images were taken of the roofing membranes. The ambient temperature was 30°F. The white membrane measured 29°F and the black membrane measured 42.4°F.

A linear heat transfer equation was used to calculate the heat transfer through the roofing system. The heating benefit was calculated assuming a 100,000 ft² building with an R=22.2. The benefit to the building owner for having a dark colored roof was \$1.36/hr.

Photo of roof on December 15, 2003



Temperature of EPDM Membrane



Temperature of PVC Membrane



The same roof systems were used to calculate the benefit to the building owner for having a white colored roof in the summer.

The table at the right shows the temperature differences that can occur on roofs in Minneapolis. This calculation used temperatures of 150°F and 105°F for the black and white membranes respectively. Using the linear equation for heat transfer, the benefit for the white roof owner was \$5.76/hr.

Of course, this is a basic 1 hr example of the cost effect. There are many other factors that will affect the total cost of cooling or heating during a season: snow on the roof, shorter winter days, the low winter angle of the sun, peak and other added electrical charges for usage in the

summer

summer, and so on.

This basic example however, demonstrates that greater savings through white roofing combined with insulation in cold climates will be achieved and it will outweigh any heating benefit of a dark roof..

