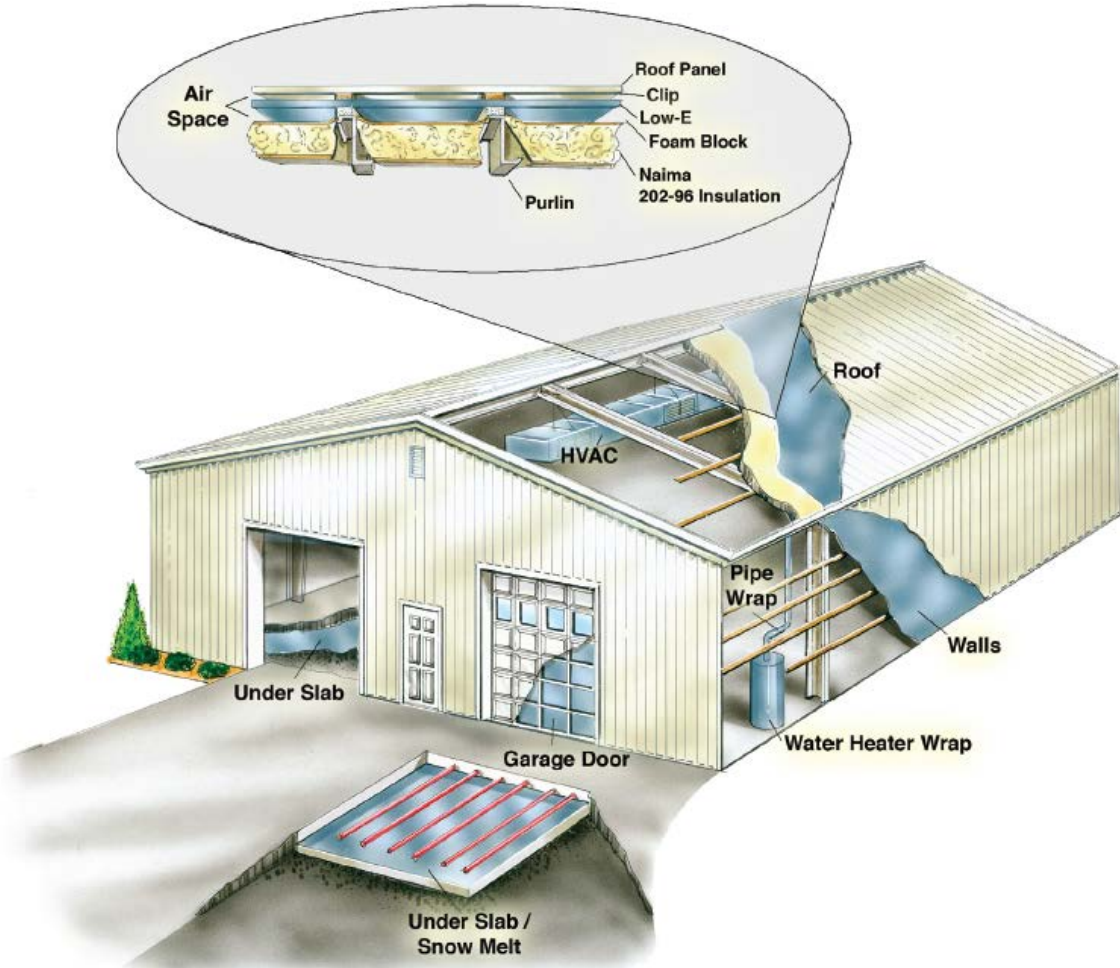


Thermal Performance of a Hybrid Metal Building Insulation Assembly

Produced by Environmentally Safe Products Inc. and tested At Oak Ridge National Laboratories

A metal building insulation assembly produced by Environmentally Safe Products Inc. (“ESP”), was tested in accordance with ASTM C 1363 in the Large Scale Climate Simulator at the Oak Ridge National Laboratory. This hybrid system consisted of conventional fiberglass blanket insulation with ESP reflective insulation installed above the blanket insulation to form two reflective air spaces between the blanket insulation and the panels of a standing seam roof. The ESP reflective insulation had aluminum foil facers on both sides to provide low-emittance boundaries for both air spaces. The upper reflective air spaces provided a continuous layer of insulation between the blanket insulation and the roof panels while the lower air space varied in thickness. One-inch thick polystyrene spacers were installed as thermal blocks above the purlins.





The Oak Ridge Tested U-Factor Results For The Winter Application Is U 0.0453

This system was tested for winter conditions and summer conditions with interior temperature controlled at 70 °F. Winter conditions were simulated with 31°F roof-top temperatures while summer conditions were simulated with 109°F roof-top temperatures. The heat-flow measurements were analyzed to provide overall air-to-air R-values and U-Factors for the hybrid systems installed on purlins that are five-feet on center. This system consisted of nominal R 19 fiberglass blanket insulation installed perpendicular and over the purlins with thermal blocks above the purlins. Mechanical fasteners held the ESP reflective insulation parallel to the blanket insulation and below the roof panels.

Heat Flow Through the Metal Purlins and Measured Air-film Resistances¹								
Climate Zone	1	2	3	4	5	6	7	8 (Alaska Only)
Metal Roof Building Requirements ²	U Factor 0.065	U Factor 0.055	U Factor 0.055	U Factor 0.055	U Factor 0.055	U Factor 0.049	U Factor 0.049	U Factor 0.035
Metal Roof Building Requirements ³	U Factor 0.065	U Factor 0.065	U Factor 0.055	U Factor 0.055	U Factor 0.055	U Factor 0.046	U Factor 0.049	U Factor 0.035
Tested Low-E Hybrid System Results	U Factor 0.045	U Factor 0.045	U Factor 0.045	U Factor 0.045	U Factor 0.045	U Factor 0.045	U Factor 0.045	U Factor 0.045
Exceeds Requirements	+43%	+21%	+21%	+21%	+21%	+8%	+8%	Does not meet

¹Summary written by Dr. David Yarbrough

²ASHRAE 90.1-2010

³IECC 2009 Commercial Table 502.1.2