Oak Ridge National Laboratory Testing
Oak Ridge National Laboratory Roof Comparison Heat Fluxes (weekly avg. daylight) Results
1997

Heat Flux in Btu/hr/sq.ft.

6/27-7/3  7/4-7/9  7/25-7/31  8/1-8/7

Thermo-Shield/wClear Coat
Thermo-Shield/only
uncoated APP panel
OAKRIDGE NATIONAL LABORATORIES TESTING UPDATE: April 2000

Since June 1997, 24 roof coating systems have been continuously tested on bitumen panels at Oak Ridge Laboratories in Tennessee, for:

- Solar reflection
- Infrared Emittance
- Surface Temperature
- Heat Flux Through the Roofing Panels

Oak Ridge is developing methods to calculate the benefit of reflective coatings based on their solar reflection and emittance, when used on roofing systems of various R-Value construction, and in various climates.

In Figure 9, on the following page, R is solar reflectance. E is infrared emittance. Our Thermo-Shield Coating with Clear Coat is the best performing coating in the testing, with a reflectance of 70% and emittance of 90%. (R70E90) The right hand column is the bitumen test panel with 5% reflectance and 90% emittance. (R05E90)

The other bars on the graph are other coatings or groups of coatings in the test program, with various R and E values as listed. Thermo-Shield coating reduced the heat flux 66% compared to the bitumen control panel in Knoxville, Tennessee. This is based on fully weathered coatings. The graph is based on "cooling days" when the outdoor temperature is above 75°F (22.5°C). Note: the annual heat flux was reduced from about 13,500 BTU per square foot on the bitumen roof panel, compared to the same panel coated with Thermo-Shield at 4,500 BTU. (145,317 BTU per square Meter to 48,439).

Figure 5, following page: Effect of Roof Insulation

This graph shows the effect of Coatings on roofs with different Insulation Levels.
- R5 LW has insulation of R-5, LW is light weight concrete or metal roofs
- R13 HW has insulation of R-13, heavy weight concrete
- R16 MW has insulation of R-16, middle weight insulated concrete

Figure 6, following page: Heat flux in cities around the USA

This graph shows heat flux calculations in various climates.
For example, a building in Phoenix, AZ with a lightweight roof R-13, coated with Thermo-Shield would have an annual heat flux of about 61000 BTU per square foot. The same type of bitumen R-13 roof would have 16,000 BTU per square foot.
THERMO-SHIELD out preformed all other coatings (Thermo-Shield left column R70E90 – bitumen control panel, right column R05E90)

![Knoxville Annual Roof Cooling Load (Btu/ft²·yr)](chart)

% decrease vs R05E90

- R70E90: 66%
- R56E90: 51%
- R48E82: 41%
- R64E11: 35%
- R50E52: 32%
- R33E90: 28%
- R39E56: 21%
- R26E68: 12%
- R05E90

Fig. 9. Annual Cooling Loads per Unit Area of the RCMA Roof using TMY2 Data for Knoxville in STAR.
Figure 5. Annual Roof Cooling Load in Knoxville, Tennessee for Various Coatings, Roof Insulation Levels and Decks

Figure 6. Annual Roof Cooling Load for an R13 Light Weight Roof for Various Coatings and Locations
July 23, 2004

Mr. Joe Raver, President
SPM Thermo-Shield, Inc.
Scotchman Pacific Marketing
Custer, South Dakota 57730

Dear Joe Raver:

IDENTIFICATION OF THERMO-SHIELD PRODUCT IN ORNL TESTING

The purpose of this letter is to identify the Thermo-Shield product that your company installed and we tested over the three-year project with the Roof Coatings Manufacturers Association (RCMA) and member companies.

The data from this project comprised the database for verification of the model of low-slope roof thermal performance that was used to generate the equations in the DOE Cool Roof Calculator. The calculator is found at http://www.ornl.gov/sci/roofs+walls/facts/SolarRadiationControl.htm as part of a solar radiation control fact sheet for low-slope roofs.

In documenting the work that produced the fact sheet, a link is embedded in the help file for the calculator. It is http://www.ornl.gov/sci/roofs+walls/facts/CoolCalcEnergyBackground.PDF. This is a copy of a paper we published on how the calculator was produced. Figure 1 of that paper shows the history over the three years of the RCMA project and beyond of the products that were tested.

The product identified in the figure as the best white latex coating is a product supplied by SPM Thermo-Shield, Inc. It was applied in June 1997 by SPM Thermo-Shield personnel to one of the uncoated black membranes over the test sections that were dedicated to the project. We instrumented the test sections and conducted the tests independently.

In all correspondence with the participants in the project, the best white latex coating was identified as coating 2A. Any data that SPM Thermo-Shield and other participants received during the course of the project were referred to by code to maintain confidentiality.

I trust that this letter provides the identification of your product that you need. Thank you again for your cooperation in our research.

Sincerely,

Thomas W. Petrie
Research Engineer