SUPERIOR PRODUCTS
INTERNATIONAL II, INC.

SUPER THERM®
BTU HEAT LOAD CALCULATION

Project: 800,000 sq.ft (74,320 sq.m) roof for American Snuff, Memphis, Tn.

Another way of finding the results of applying SUPER THERM® over the roof of the tanks or any facility would be to use loading of heat per BTU/HR/sqft from the ASHRAE (**American Society of Heating, Refrigerating and Air Conditioning Engineers)** HANDBOOK OF FUNDAMENTALS 2009 STANDARDS.
For example: A roof deck with current 2" (50mm) of fiberglass for insulation.
From the handbook, the following values are given:
R1 =0.17 Top of roof air film
R2 =0.33 Black or weathered aluminum alkyd paints
R3 =10.00 2" fiberglass
R4 =0.00 Metal roof deck
R5 =0.68 Bottom of Roof Deck Air Film
The formula for the Thermal Resistance of the roof is (T1-T2) / (R1+R2+R3+R4+R5)= BUT/HR/sq.ft. Resistances (R) for the roof assembly are as indicated above.

Actual test assembly:

Assembly No.1: Black EPDM Roof Membrane, 2" fiberglass insulation and Metal Roof Deck

Assembly 1 roof temperature reading was taken from the top surface of the black EPDM roof. A temperature reading of 190.8F was recorded. A second temperature reading was taken from inside the building directly below the roof where the 190.8F temperature was taken. The temperature reading taken below the roof was 103.0F, resulting in a temperature difference of 87.8F.

Assembly No.2: Black EPDM Roof membrane painted with SUPER THERM®, 2" fiberglass insulation and metal roof deck.

Assembly 2 roof temperature reading was taken from the top surface of the black EPDM roof which had been coated with SUPER THERM®. A temperature reading of 121.0F was recorded. A second temperature reading was taken from inside the building directly below the roof where the 121.0F temperature was taken. The temperature reading taken below the roof was 95.0F, resulting in a temperature difference of 26.0F
The roof "U" factor is equal to the inverse of the "R" factor of 11.18 or 0.0894 (1/11.18).
The thermal resistance of the two roof assemblies are:
Assembly 1: (190.8°-103.0°) / (R1+R2+R3+R4+R5) = 87.8 / 11.18 - 7.85 BTU/HR/SQ.FT
Assembly2: (121.0°-95.0°) / (R1+R2+R3+R4+R5)= 26.0 / 11.18 = 2.33 BTU/HR/sqft
Difference between roof assemblies is 5.52 BTU/HR/sq.ft.

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The 5.52 BTU/HR/sq/ft difference for the 800,000 sqft = 4,416,000 BTU/HR/sq.ft. The 4,416,000 BTU/hr/sq.ft / 12,000 BTU/HR/TON = 368 Tons of equipment savings.
Using a Standard HVAC calculation program was used to show the difference in A/C tons needed to cool this size facility.

To verify the findings, a standard calculation from the CHVAC-FULL COMMERCIAL HVAC LOADS CALCULATION PROGRAM was used from the book to show the difference between a "Dark Colored Roof" and a "Cool Roof". The following are slightly different from the actual readings but verifies the findings from the actual readings on the test roof.
Using a Standard HVAC calculation program was used to show the difference in A/C tons needed to cool this size facility.
Exhibit 1: A dark colored (low reflectance) roof will require 626.22 tons of equipment to cool the roof.
Exhibit 2: The roof coated under the cool roof program® requires 326.68 tons of equipment to cool the roof.
Tons of equipment difference is 299.54.
There is 3,600,000 BTU/HR (300 Tons) to be saved by coating under the cool roof program.

Additional information from a HVAC group looking over these figures and analyzing the numbers as related to HVAC.
With the reduction of the equipment load by 300 tons, and with annual cooling hours of a standard 4000 hours per year, using an average efficiency of 1.25 KW/Ton for their cooling equipment and an average cost of $.10 per KW for energy, their annual energy savings would be at least $150,000 per year for consumption cost. If they pay peak demand charges, these would also be reduced by approximately 47%. Then there is the issue of capital cost avoidance. The average cost of commercial HVAC systems is $1,200 per ton, so we are looking at a savings of $360,000 on equipment cost. There is also the consideration of reduced maintenance cost due to fewer units running with less stress or full load conditions.
There is no way to put a finite number on the total savings, that will be generated by this report, but when we consider energy consumption, peak demand charges, equipment cost, equipment maintenance and life extension of the roof, we are well over $500,000 annually in savings. **For a 800,000 sq.ft. (74,320 sq.m) roof, this is $0.625 cents per sq.ft. per year or $6.25 per sq.m reduced cost per year in energy and equipment savings.**

Given this savings per sq.ft., the rubber company that claims a cancelation in warranty if you coat over their rubber and they charge $0.05 per sq.ft per year for the warranty or $40,000 per year, the savings of $500,000 per year from coating with SUPER THERM®-- versus-- paying them $40,000 per year for no energy savings, no equipment savings and no extended life of the roof and in consideration that the cost of any fix is only a fraction of the $40,000, this is definitely a no brainer.
Net savings to this customer per year w/o any repairs = approximately $540,000.