



## *Field Test Results*

### **ENERGY HOME-SHIELD**

### *Radiant Barrier System*

On June 12<sup>th</sup> thru 18<sup>th</sup> 2001, a survey was conducted at a facility located in Lakeland Florida in accordance with the State of Florida Energy Office / ENERGY CONSERVATION ASSISTANCE PROGRAMS Designation: **ECAP-CUL-1-99**

**Test Method for Comparing Utility Loads in Standard Constructed Buildings.**

The objective of this procedure is to determine the impact of the *"As Built Conditions and As Installed Components / Equipment"* on the utility loads in occupied residential, commercial and government buildings.

The focus of this procedure is to provide *a comparison* to known standards for all parties interested in using *passive energy devices to displaced conventional utility loads*.

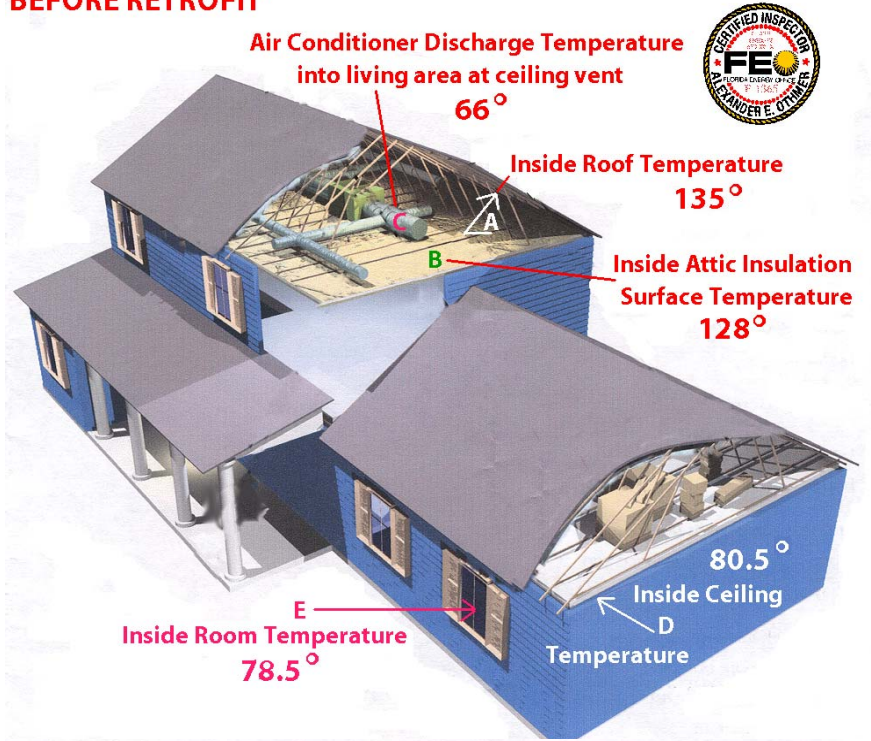
This procedure addresses the energy consumption properties of the equipment and structural envelope tested and has no relationship to structural, electrical or fire code requirements.

- Our survey indicated that the *Total, Roofing System, Solar Heat Loads* on the structure tested were being significantly reduced by **27% during day light hours**, by the use of your **ENERGY HOME-SHIELD Radiant Barrier System** as a **Energy Conservation Measure (ECM)**.
- *This is being accomplished with no negative effect on the existing buildings Architectural Aesthetics or water tight integrity, and is also reducing Solar Gain related air conditioning cost.*

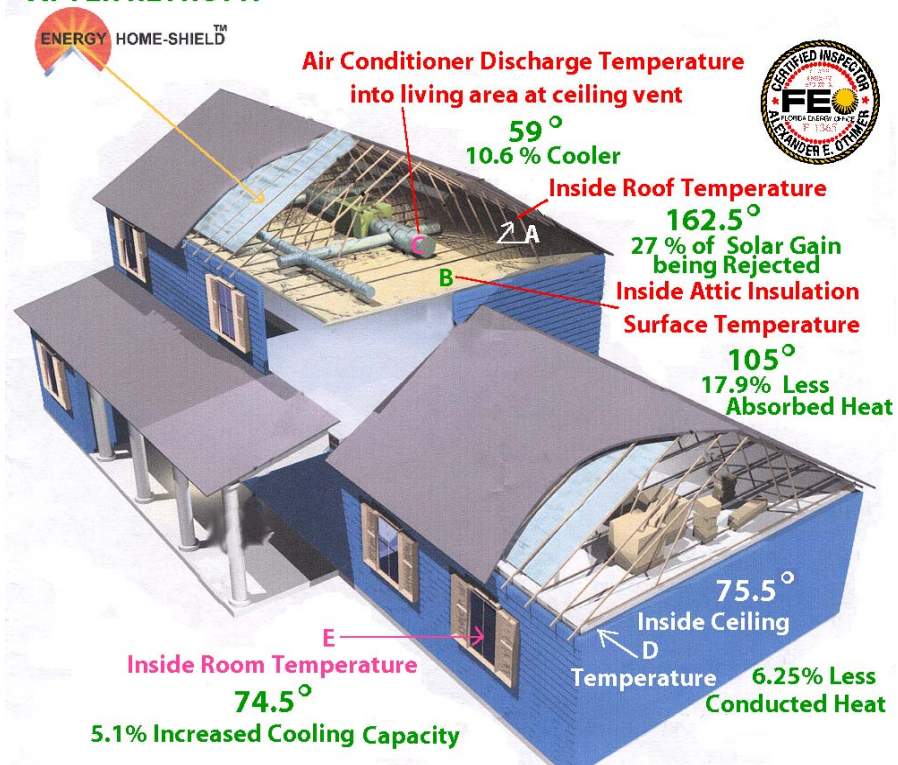
**SURVEY RESULTS / EXECUTIVE SUMMARY**  
**ENERGY HOME-SHIELD Radiant Barrier System**

The illustrations below show a synopsis of our findings;

**BEFORE RETROFIT**



**AFTER RETROFIT**

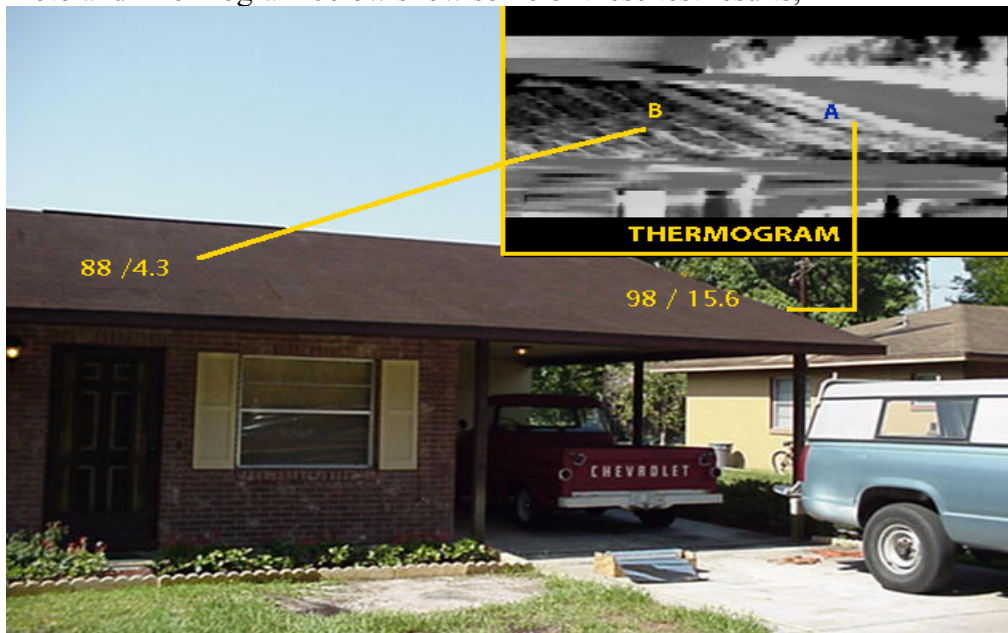


## *EXECUTIVE SUMMARY Continued*

Our survey data indicates that your, as installed, *ENERGY HOME-SHIELD Radiant Barrier System* consisted of ;

- 1,000 Square Feet of Installed Material.
- Was **Rejecting 15.6 BTU** per Square Foot per Hour of thermal load.
- On the facility surveyed this is the equivalent of 1.43 Tons of Air Conditioning Load per hour.

The Photo and Thermogram below show some of these test results;



The lighter areas in the Thermogram indicate Heat while the darker areas indicate cooler temperatures.

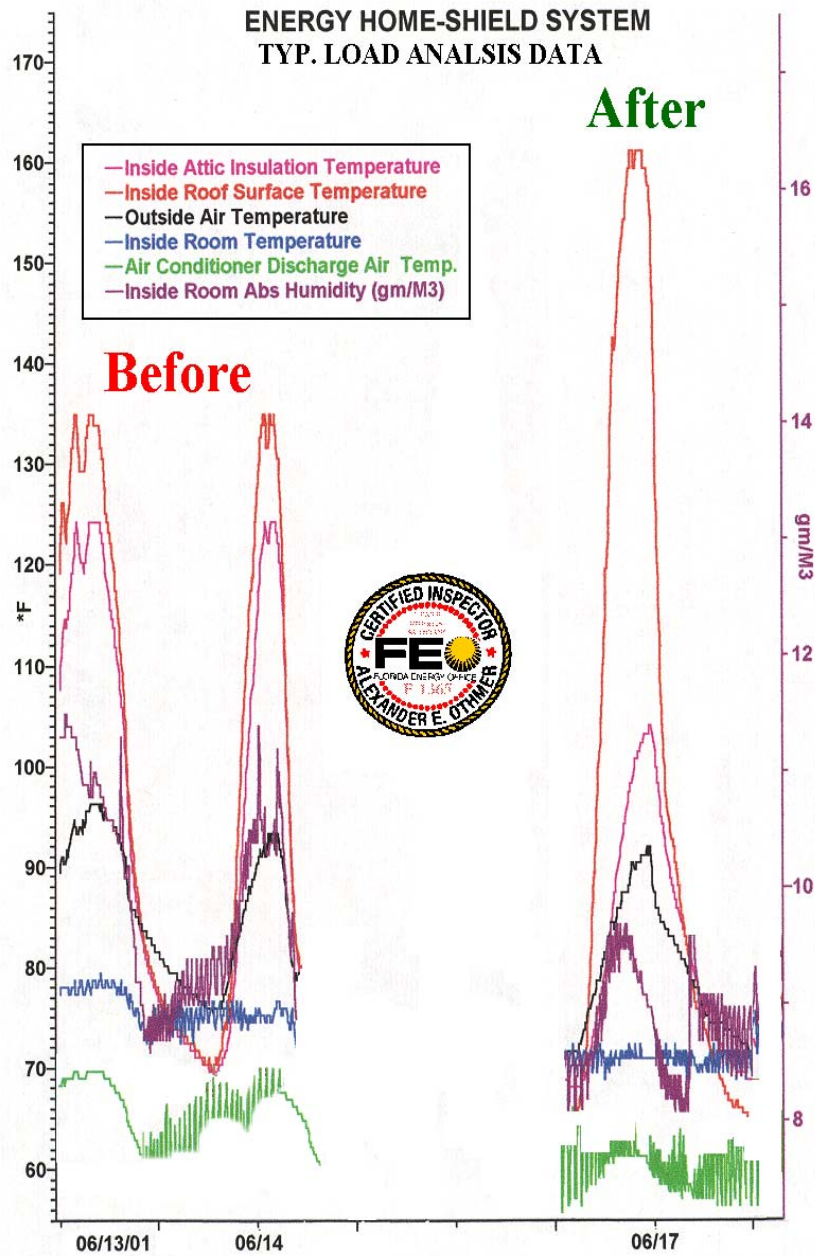
Area ( B ) in the Photo and Thermogram show the roofing system loosing conditioned air from inside the house ( roof surface temperature of 88 degrees ). ***This area had not been retrofitted*** with the *ENERGY HOME-SHIELD Radiant Barrier System* .

Area ( A ) shows a section of the roof ***that had the ENERGY HOME-SHIELD Radiant Barrier System*** installed. You can clearly see the amount of heat being Rejected ( white areas ) and the higher surface temperature ( 98 Degrees ).

In this instance, that is ***10 Degrees less heat*** that the air conditioner system has to contend with.

## Survey Results

In all 1,444 Data Points were recorded over a 120 hour period, the chart below shows a synopsis of the type of data collected;



To further qualify the building as a *modified climatic chamber* in accordance with ASTM C-976-90, all thermal load producing building envelope components were analyzed by use of Omega Engineering HSF-1 Heat Flux Sensors prior to the above test.

**ENVELOPE SYSTEMS TESTED**

**Table # 1** All load producing components were tested as follows:

TYPE OF SYSTEM	BTU PER SQUARE FOOT PER HOUR	INSIDE SURFACE TEMPERATURE RECORDED	APPROXIMATE R-VALUE	APPROXIMATE U-VALUE	TOTAL BTU / THERMAL LOAD & UV TRANSMITTED
LIGHTING FIXTURES & APPLIANCES	206	146	NA	NA	206 / 146
	82	112	NA	NA	82 / 112
WINDOW SYSTEM	118	106	1	.64	118 / 104
OUTSIDE FACING WALL	3	76	12	0.080	3 / 76
DOORS	90	83	7	0.075	90 / 83
CEILING SYSTEM	6	82	19	0.080	6 / 82
FLOOR SYSTEM	10	72.	3	0.270	6 / 72

**TOTAL SYSTEM LOADS AS TESTED** WITH NO OCCUPANTS

TOTAL FACILITY PRESENT LOADS 515 BTU PER SQUARE FOOT PER HOUR.

REDUCED ROOF LOAD AFTER RETROFIT 15.6 BTU PER SQUARE FOOT PER HOUR.

**Weather conditions during the test period were as follows:**

High Temperature 96.2 Deg. F. Average Wind Speed 6 MPH  
 Average UV intensity 97 A+B Outside Humidity 87 %  
 Mostly sunny conditions with occasional light moving clouds.

The facility was a 19 year old, standard constructed Concrete Block, 1,100 Square Foot, Single Story Residential Home with a standard wood and shingle roofing system.

The attic had 4 inches of blown fiberglass insulation evenly distributed over the living areas between the ceiling joist.

*No other Energy Related Retrofits were apparent during the test period.*

The roofing system faced **North West and South East** at a Longitude of 81 Degrees 56 Minutes and a Latitude of 28 Degrees 04 Minutes. The photo below shows the actual structure from the North East side.



The Air Conditioning system was an older ( 10 + Years ) type with a very low efficiency. At the time of the survey the occupants were out of town allowing for *a controlled environment*.

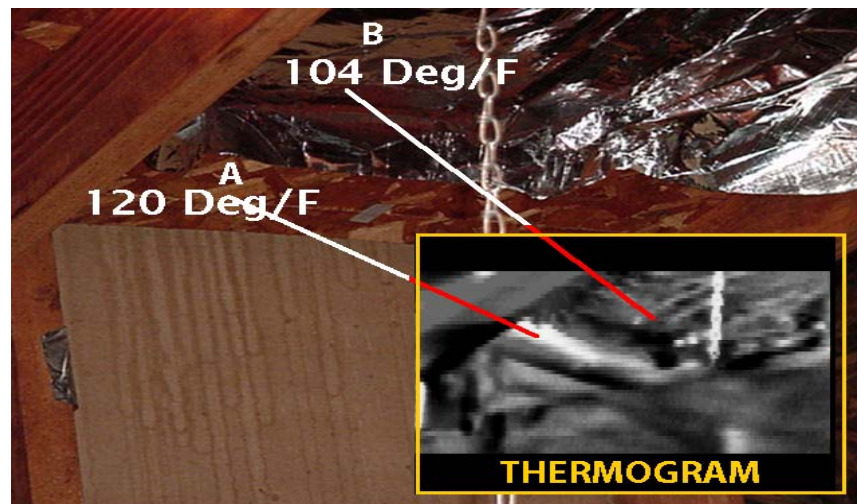
- Air Conditioner Thermostats were set at 79 Degrees.
- Data was collected 48 hours prior to the retrofit.
- Data used to calculate our results was taken *29 hours after the retrofit* to allow the structure to *Load and Unload naturally* and *reduce the chance of a precision bias*.

### **SYSTEM TESTED**

The *ENERGY HOME-SHIELD Radiant Barrier System* consists of;

- Two layer aluminum foil laminated to layers of polyester and polyethylene, this multi layer composition adds additional strength for heavy duty service.
- A patent pending *“SELF ATTACHING SYSTEM”* that requires no additional glues, nails or staples for permanent installation. Total installation time was **less than 5 Hours due to this innovation**.
- An Installed EMITTANCE VALUE of .01 to .03
- Parent Materials meet ASTM C1313 and qualify under the EPA/DOE Energy Star Insulation Program.
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As tested the system was installed at 3.50 inches below the inside roof surface area. The photo and Thermogram below show some of the typical properties of the system;



Area ( A ) shows the inside roof surface temperature prior to being covered with the ***ENERGY HOME-SHIELD Radiant Barrier System***, area ( B ) shows the resulting THERMAL REJECTION that the retrofitted areas are providing.

### *Test Conclusions*

As installed, at the time of this survey, the ***ENERGY HOME-SHIELD Radiant Barrier System*** installed by Energy Home Shield, P.O. Box 6244 Lakeland Florida 33807-6244, would qualify as an ***Effective Energy Conservation Measure*** in accordance with the criterion set by the State of Florida Energy Office / ECAP Program.

#### *The system, as installed, reduced;*

- Air Conditioning System Run Time by **15%**
- Air Conditioning Discharge Temperatures by **10.6%**
- Conducted Attic to Ceiling Heat by **6.25%**
- Living Area Room Temperatures by **5.1%**
- ABS Humidity by **23%**

The above was accomplished by ***Rejecting 27% of the Solar Heat Gain*** that had been being ***Absorbed into the Attic System*** prior to the installation of the product.

### *Closing Comments*

Due to this products **obvious performance characteristics and ease of installation** it would be a valuable asset to both our



&



programs. We would encourage you to look into partnering with both of these programs as soon as possible.

### ***"Saving Energy Saves Everything"***

On behalf of the United States Department of Energy, The State of Florida Energy Office and the United States Environmental Protection Agency, let me thank you for your efforts in assisting others to Conserve Energy and for considering your ***Energy Conservation Assistance Program and the University of South Florida's SBDC as an ally.***

This report is meant to be an educational guide to familiarize you ***with the performance of your chosen Energy Conservation Measure and should not be construed as an endorsement of any product or service by name or specific design.***

Once again let me ***thank you*** for giving us the opportunity to use your facility as a field test site. The data collected is a valuable asset to our program in building a comprehensive profiling of ***actual energy related loads*** that occur in ***occupied / operational buildings***. This type of data is critical to other Engineers facing decision making tasks, where published measurement and verification data is not yet available ***or inaccurate***. Please feel free to contact our offices if we can be of any assistance in helping you meet your future conservation goals.

**Alexander E. Othmer** CEA/CBA/NDEIII

Mgr. Florida Department of Community Affairs Energy Office / E C A P  
University Of South Florida / Small Business Development Center

