GÜLER KİMYA YALITIM
ADANA REPORT, TURKEY

High Efficient Solar Reflective Coating: SuperTherm®

Client

Project Owner

Supertherm Producer

Partner for Güler Kimya

Controlled and monitored by

Industry Service

Title: High Efficient Solar Reflective Coating: SuperTherm®

Date: 16th of April 2008

Contents: Report on Solar reflective Coating, named SuperTherm®, which was tested on its energy saving capacities on cooling costs for Vodafone's mobile phone containers.

Location: The field test was performed at the Vodafone facility in Adana, Turkey.

Testing period: The 2nd, 3rd and 4th of April 2008

Test owners:

- Güler Kimya, Turkey, operational guidance and distributor of SuperTherm® in Turkey
- SC2 Trading, The Netherlands, distributor of SuperTherm®, and partner of Güler Kimya
- Superior Products International II, USA, producer of SuperTherm®

On behalf of:

- Vodafone Global, represented by Mr. Bruno Ponzonetto

Controlled and monitored by:

- TÜV SÜD, Germany, which performed the testing and monitoring of the results in this report

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1. Company Introductions

1.1 Güler Kimya

Guler Kimya Makina Turizm Ithalat Ihracat Sanayi ve Ticaret ltd.Sti. was established in 2005 as an official local distributor of "SC2 Trading" for Turkey. Güler Kimya is dedicated to provide problem solving coatings produced by "Superior Products International II". Our specialties include Supertherm® a ceramic coating, "for heat reduction and reflection". Rustgrip® is used for corrosion prevention and concrete protection.

Other industrial coatings, like many epoxies, solvent,- and water based products, solve problems in the area's of high heat control, anti-graffiti, fireproofing and energy saving. Güler Kimya is an authorized, factory-related representative for the fine coatings of SC2 Trading and Superior Products International.

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1.2 Superior Products International II, Inc.

Superior Products International II, Inc. is a rapidly growing and leading edge developer and manufacturer of advanced technology, environmentally friendly, and energy saving coatings.

SPI is committed to supplying new and innovative coatings that present specialized solutions to previously unsolvable problems and to providing the highest quality and performance to our customers. SPI's unique coatings offer a solution-based approach for a broad range of industrial, petrochemical, commercial, and residential applications.

With over 20 years of use and performance in some of the toughest environments, the SPI coatings have provided insulation by blocking initial heat load over surfaces, corrosion protection and control using minimum-to-no surface preparation, and fire protection directly over structures with simple spray application. These formulations have been developed, refined, and proven as the finest in the world market. Creative and dedicated employees, comprehensive customer service, and exceptional quality coatings are the foundation for this success.

Founded in 1989 by Joseph E. Pritchett, SPI is a privately held company with headquarters in Shawnee, Kansas. From the beginning, SPI has supplied coatings to the international market and developed long-term associations in the Far East, Asia, Europe, the Middle East, South America, Mexico, and Africa.

1.3. Superior Coatings & Concrete Trading

SC2 Trading is a Dutch company with the exclusive distribution rights for many new and revolutionary products that have unique properties. Their functionality is many times larger than comparable products. Therefore we achieve a more efficient production process for our customers by creating savings on energy, maintenance and production.

The products are produced by Superior Products International II in the United States of America where they are constantly developing new technologies and formulas for their coatings, in a way that their added values solve problems and save costs.

SC2 Trading is distributing the products throughout the world, many testing projects have been set up.

2. Projectdefinition

In order to reduce energy costs which are increasing day by day, an energy saving project was initiated with “Guler Kimya”, “SC2Trading” and “Vodafone global”, represented by Mr. Ponzonetto.

In June, July and August 2007 a first test was done on the Mobile Phone shelters, used by Vodafone Turkey.

The results from these tests had to be verified by an official testing institute. In accordance with Vodafone, Guler Kimya and SC2 Trading, it was decided to use TUV SÜD, a well recognized German testing agency.

Therefore the testing shelters were transported to Adana, Turkey to test the heat reflecting capacities of SuperTherm® and therefore measure the energy saving that will occur. The tests were done on the 2nd, 3rd and 4th of April 2008. The TUV report can be found in appendix 2.

2.1 Purpose of the project

Verification of previous testing results, controlled and measured by TUV SÜD, Germany, to determine the contribution of the heat accumulation inside the GSM shelters caused by sun radiation and reduction of AC’s energy consumptions by using Supertherm®

2.2 Expectations

- Remarkable Energy Saving; up to 50% on energy use of aircontioner
- Finding applicable methods for implementation on shelters
- Finding applicable methods for implementation on outdoor cabinets
- Feasible and cost effective solutions

2.3 Attendance List

Name	Company
Mehlika Coşkun	TÜV-SÜD
Yeşim Başar	TÜV-SÜD
Bruno Ponzonetto	Vodafone Global
Onur Kutlu	Vodafone Turkey
Barış Aysel	Vodafone Turkey
Selçuk Ay	Vodafone Turkey
Muammer Güler	Güler Kimya
Cengiz Ay	Güler Kimya
Eric Schoonenwolf	SC2 Trading

2.4 Project Customers

- Vodafone Turkey
- Vodafone Global, within the countries, South Africa, Tanzania, Mozambique, Egypt, India, China.

3. General information

3.1 Heat

The definition of heat is a form of energy associated with the thermal motion of atoms or molecules. Re-phrased, heat is the transfer of kinetic energy from one medium or object to another, or from an energy source to a medium or object. The transfer of energy from one body to another as a result of a difference in temperature or a change in phase.

Such energy transfer can occur in three ways: *radiation, conduction, and convection.* Capable of being transmitted through solid and fluid media by conduction, through fluid media by convection, and through empty space by radiation.

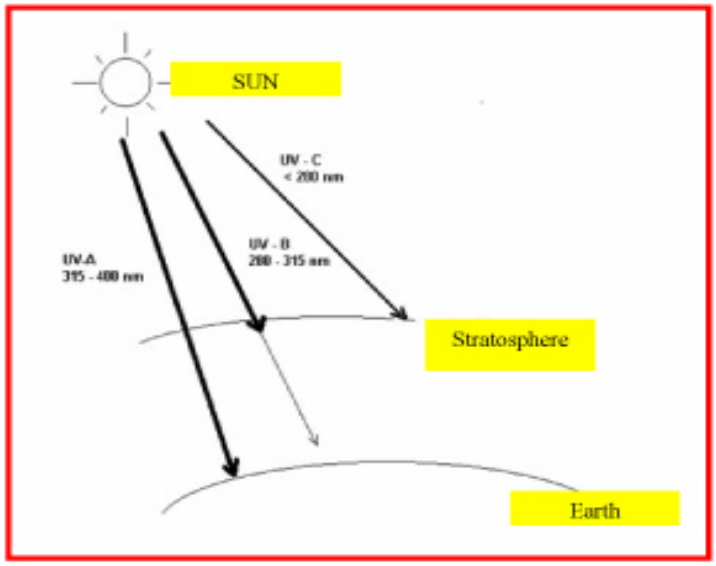
Solar-thermal-heat is trapped using the greenhouse effect. Heat and IR (infrared radiation) are produced when short wave radiation such as visible, UV (ultra violet) and infrared light strikes the surface.

The sun is higher in the summer sky and lower in the winter sky. When we stand in the sunshine, the sunlight feels warm because we are taking in heat energy from the sun. This heat travels through space to earth in invisible, straight lines called heat radiation.

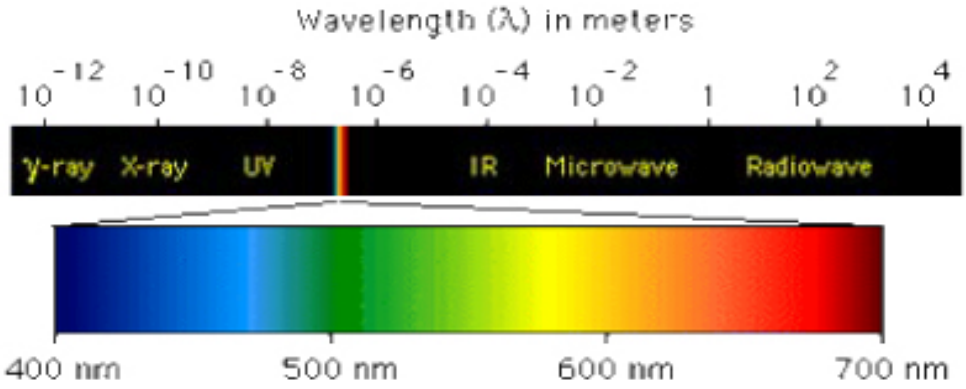
This radiant heat is what you feel when you stand next to a fireplace or stove - one side of you is warmed, while the other remains cool. A passive designed home collects this heat directly as sunlight coming through windows warming interior objects and then radiates the heat into the interior air.

3.2 General information on solar energy effect

There is a theory about the suns solar wavelengths. Short wavelengths contain energy and that energy is conveyed to the earth. It damages human body cells more than the other long wavelengths. Approximately 33% of the solar beams are reflected by the ozone layer and absorbed by the atmosphere. 40% of the sun solar beams are inside the infrared spectrum. The heating is caused by these infrared beams. 50% of the sun solar beams are visible light beams that contain all colors. The rest of the percentages (10%) of the suns solar wavelengths are the ultraviolet beams.
Solar electromagnetic beams are named according to their wavelength. These are Ultraviolet (100-380 nm), Visible (380-780 nm), and Infrared (780-10.000 nm)
Approximately 5% of the solar electromagnetic beams that reaches (to) the earth is Ultraviolet beam with a wavelength (is) between 100-380nm. 95-98% of this is UVA (315-400nm), 2-5% of this is UVB (280-315nm) and UVC (100-280nm) beams do not reach (to) the earth, because the ozone absorbs it.



Wavelengths	Name/Colour
100 - 380 nm	ultra-violet
380 - 436 nm	purple
436 - 495 nm	blue
495 - 566 nm	green
566 - 589 nm	yellow
589 - 627 nm	orange
627 - 780 nm	red
780 - 10.000 nm	infra-red



Wavelength in Nano meters

3.3 Shelters and Heat

Shelters influenced by two type heat sources. One of this is internal heat sources that are produced by active electronic equipment. It is called Convection. For example how can a heater on one side of a room, heat the entire room? Convection. The heater warms up the air just around it. As this heated air rises, cold air sinks down to take its place. This cold air is then warmed by the heater and as it becomes heated, rises. Soon, air is moving around the room, carrying heat energy with it, until the temperature of the entire room is higher.
The other type is external heat sources that are radiated by the sun. It is called Conduction. For example when heat moves through materials that are in direct contact with each other, that is conduction. A pan, warmed by the stove beneath it, conducts heat to the soup inside it, to the sides and handle of the pan itself, and to the air immediately surrounding it.

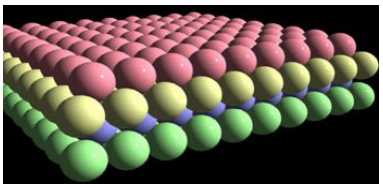
3.4 Cooling methods

- Passive Cooling
- Shading
- Thermal Insulation
- Cooling
- External Shades and Shutters
- Interior Shades and Shutters
- Reflective Films and Tints
- Ventilation
- Other Products
    - Heat Reflective Membrane
    - *Heat Reflective Paint Supertherm®*

4. Product Introduction

4.1 General Information about Supertherm®

SuperTherm® is a water-based paint, developed with the help of ceramic engineers from Marshall Space Centre. No co-solvents are present and will dry by evaporation. Heavily tested for over 2 years, the three ceramic compounds ultimately chosen were selected from over 600 according to their ability to reflect heat and their non-conductive properties.



Multi-ceramic insulation coating blocks 99.5% of the three sources of heat - visual light, ultra violet rays and infrared rays.

SuperTherm® is designed with four separate ceramics (the four resins used offer a vehicle for the ceramics, as well as flexibility, durability, and heat-resistance.) - two are reflective, one acts as a dead air space between the coating surface and the substrate and the fourth blocks (99.5)% infrared.

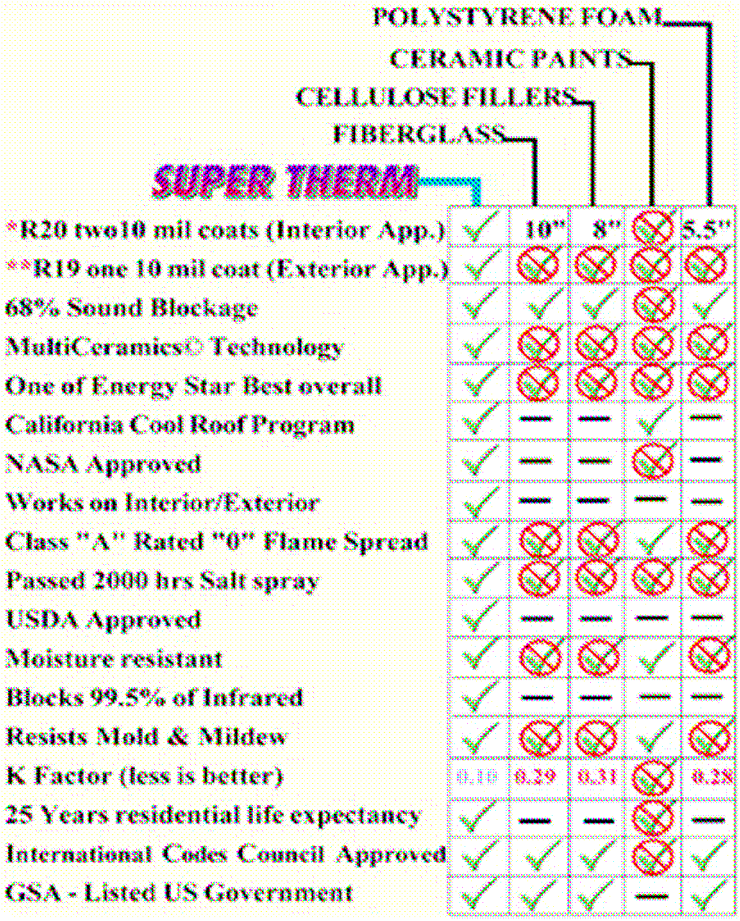
SuperTherm® tested by the Thermo Physical Research Laboratory for comparative R19 equivalent insulation factor SuperTherm® blocked 92% of the heat. No other R19 equivalent insulator can claim that! No Fibreglass, No Foam, No Cellulose, No other single ceramic paint.

1. Two ceramic compounds are primarily to repel radiation and offer reflective abilities. These two ceramics repel better than 95% of the sunlight and radiant heat (short wave).
2. The third ceramic compound is to stop 92% heat and / or cold conduction by hollow sphere technology that is not glass.
3. The fourth ceramic compound is designed specifically for stopping infrared radiated heat. This ceramic blocks 99.5% of Infrared Radiation (long wave) to control the heat gain or loss to the envelope of buildings or equipment

The resin/ceramic combination delivers a coating that can reflect heat and fire, withstand the elements for a minimum of 30-40 years, dries to a very tough surface, yet can endure a 180-degree bend without cracking.

This allows SuperTherm® to be an actual "insulating" coating, not just a reflective coating. The urethane resin acts to bind all the other resins and ceramics together and provides a vapour barrier in the dry film similar to the paper backing on batt insulation.

SuperTherm®'s design is based on the latest ceramic technology known in the science field today with continuing research and testing to keep it the best insulating coating in the World.



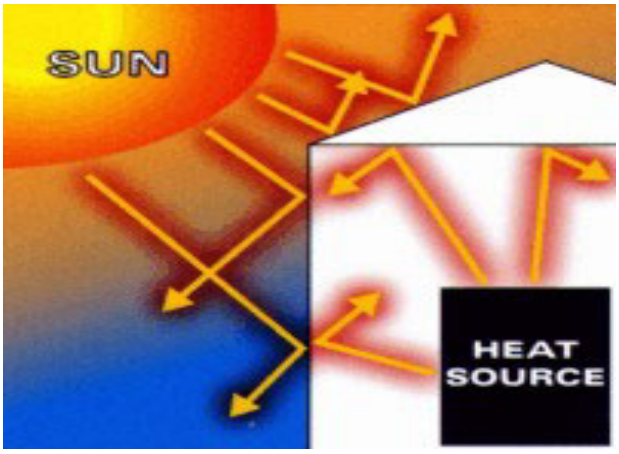
Market

= Approved

= Partial approval

= Not Possible

- *R20: (Interior Application) Supported by ASTM C236 Guarded Hot Box Test with two coats at 10 dry mils / 250 microns each.
- *R19 (Exterior Application) supported by ASTM C236 Guarded Hot Box Test, ASTM E-1461-92 Thermal Diffusivity & ASTM E-1269 Specific Heat tests, additional R9 comes from "reflectivity" factor of SuperTherm® (92% of sunlight and 99.5% of Infrared radiation).
- USDA (US Department of Agriculture) - approved for use in and around food preparation.
- K Factor: A term for thermal insulation value or coefficient of thermal conductivity, which is the amount of heat that passes through a unit cube of material in a given time when the difference in temperature difference across the cube is one degree.



SuperTherm® barrier maintains heat on the surface side of the building - will not allow penetration.

SuperTherm® can be used for concrete walls

SuperTherm® was applied on the surface of storage tanks

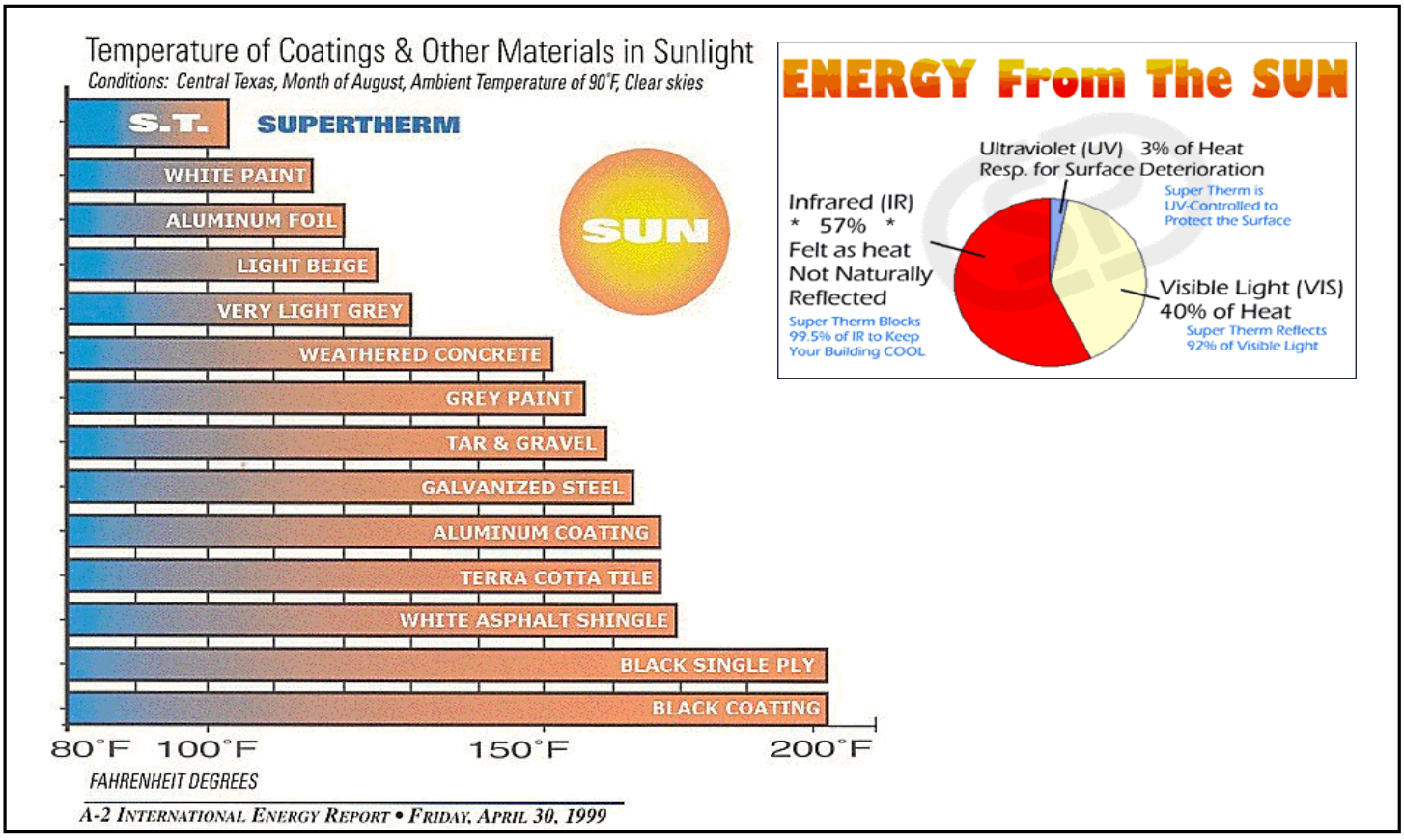
SuperTherm® can control heat exchange between the inside and outside of a building. By implementing SuperTherm®, the effectiveness of the isolative ability will increase because when SuperTherm® is applied to the exterior side of the wall, it repels exterior heat and moisture to prevent it from entering the wall. At the same time, it helps to control the loss of heat from the inside during the winter months by bouncing back the heat waves travelling from the interior heated room through the wall structure escaping to the outside.

4.2 Other Specific Uses of SuperTherm®

- Industrial / chemical plants.
- Oil and gas storage tanks / pipeline
- Interior and exterior walls on building / residential, commercial, warehousing
- Roofing on any structure
- Swimming pool decking or concrete.
- Freezers / refrigeration units / trucks / trains / boats.
- Air conditioning unit outer casings, evaporative coolers.
- Mobile homes / motor homes / cars / trucks
- Poultry, cattle - all animal shelters

4.3 Benefits of the SuperTherm®

- SuperTherm® is water-based. This offers tremendous advantages to the user of the product.
- SuperTherm® does not require extra effort work in clean up of equipment and allows equipment longer life.
- The product is non-toxic, non-flammable, will not smoke and offers--due to the ceramics--some soundproofing. It has been fire-tested with '0' flame and smoke results.
- SuperTherm® cures out completely in one week to an extremely tough, durable, non-yellowing, water-resistant coating that also provides flexibility a ultra-violet stability.
- Clean-up with soap and water or just water by itself is sufficient.



5 Testing and Measurements from Vodafone facility in Adana, Turkey

5.1 Testing period

The testing period in Adana, Turkey was 3 days. There was decided that this period was sufficient to verify the testing that was done in June, July and August 2007. The same containers were used, so SuperTherm® was applied approximately 1 year ago.

5.2 Test conditions and set up

- The containers are equipped with an air conditioner.
- The devices produce a certain heat.
- Max allowed inside temperature 45 ˚C (due to equipment)
- Desired inside temperature 23 ˚C
- A thermostat was inside the container connected with air conditioner
- Two standard containers from Vodafone Turkey.
- These containers were equipped with insulation already.
- They contained both the same type of air conditioner.
- They both had a thermostat inside the container put at 23 ˚C constantly.
- One container was treated with Supertherm the other was left like it was.
- An energy measurement device was installed to measure energy use of air conditioner.

5.3 Measurements*

- Weather conditions
- Daily ambient temperature
- Temperature on the outside of the container at set times.
- Temperature on the inside of the container at set times.
- The time-line of measurements were daily, at 11:00 AM, 13:00 PM and 14:00 PM
- Energy use of air conditioners

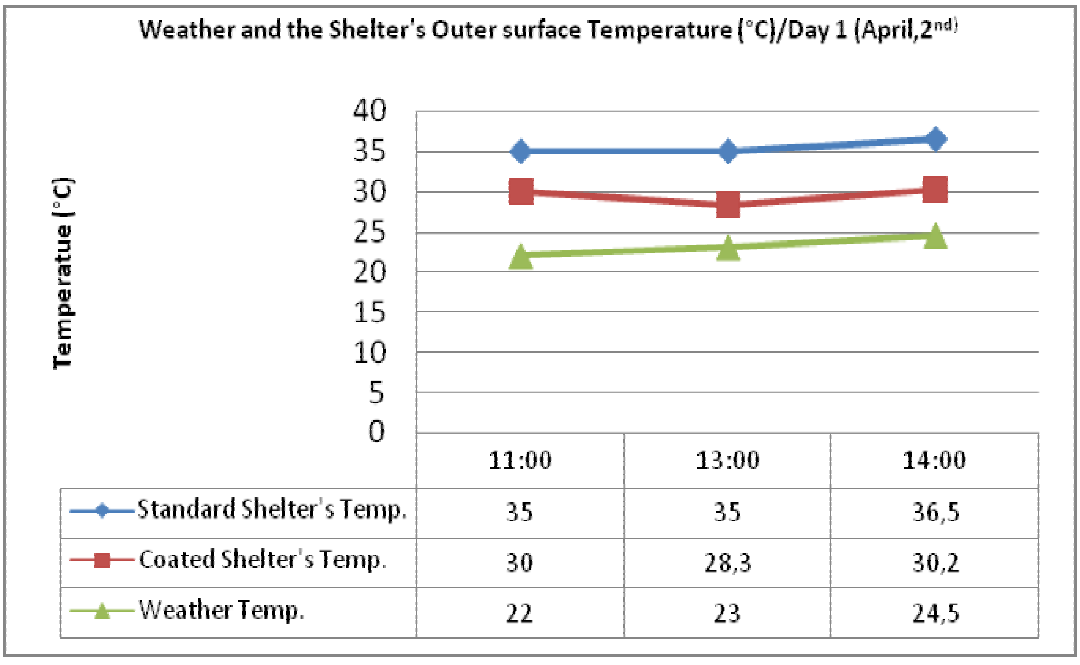
* The measurements on both containers, coated and standard, were exactly the same.

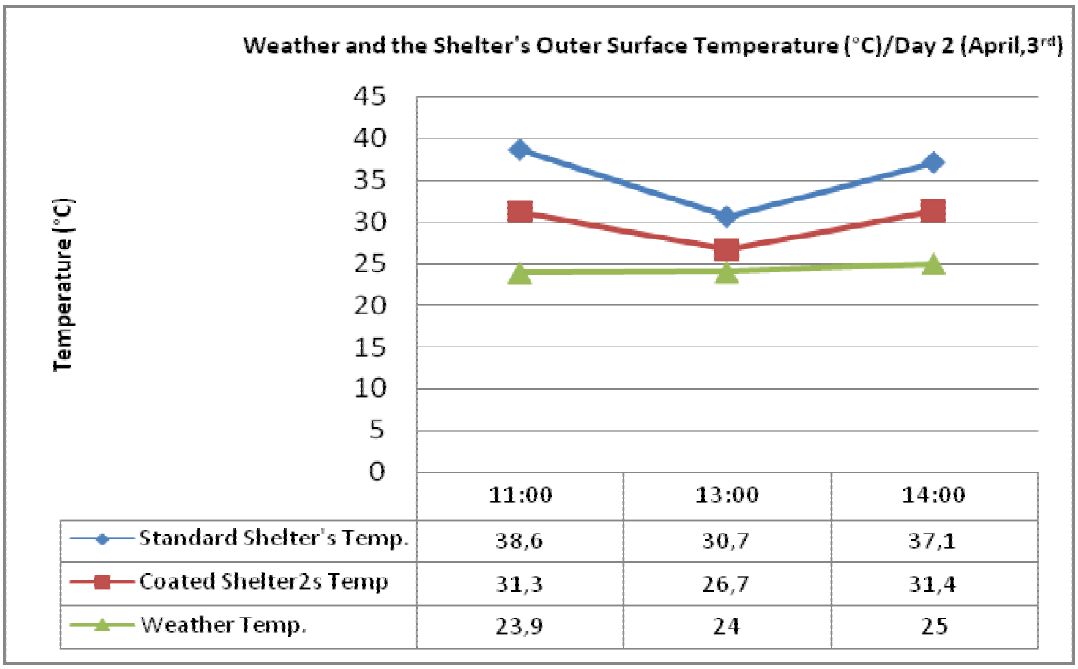
5.4 Test results and comments

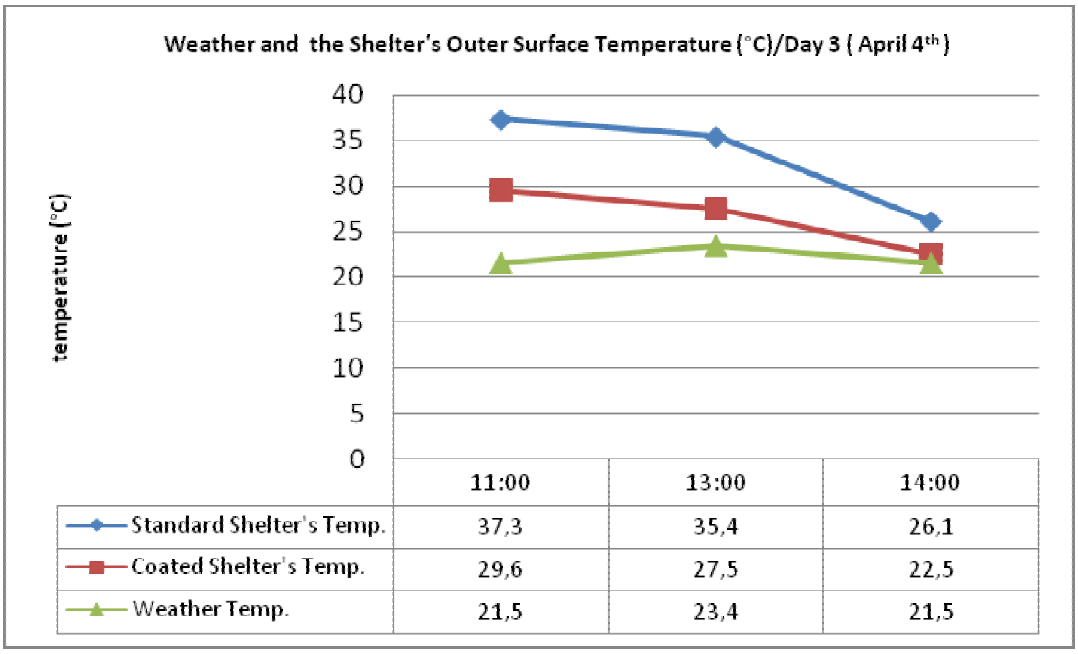
5.4.1 Temperature changes and power consumption

During the trial period the weather in Adana was partially cloudy and so therefore the shelters were not continuously subjected to direct sunlight.

	Standard Shelter Times			Coated Shelter (Superthem®) Times		
Day 1 (April,2nd)	**11:00**	**13:00**	**14:00**	**11:00**	**13:00**	**14:00**
Weather Temperature in Adana °C	22	23	24,5	22	23	24,5
Inner Temperature of Shelter °C	22,5	17,2	25,3	22,8	18,6	25
Outer Temperature of Shelter °C	35	35	36,5	30	28,3	30,2
Power Consumption Value kWh	2776,179	2778,534	2780,917	1629,179	1630,065	1631,201
Day 2 (April,3rd)						
Weather Temperature in Adana °C	23,9	24	25	23,9	24	25
Inner Temperature of Shelter °C	24,5	18,5	22,4	25,7	22,7	18,5
Outer Temperature of Shelter °C	38,6	30,7	37,1	31,3	26,7	31,4
Power Consumption Value kWh	2826,768	2831,536	2834,084	1641,738	1644,244	1645,091
Day 3 (April,4th)						
Weather Temperature in Adana °C	21,5	23,4	23,2	21,5	23,4	23,2
Inner Temperature of Shelter °C	21,4	22,3	22,5	21,3	22,2	21,6
Outer Temperature of Shelter °C	37,3	35,4	26,1	29,6	27,5	22,5
Power Consumption Value kWh	2872,84	2876,717	2878,484	1641,44	1663,502	1664,484







Comments

As shown in the diagrams above the outer surfaces of the shelters showed different temperatures between the standard shelter and the coated shelter. The weather temperatures were between 21°C and 24°C. Depending on the cloudes the coated shelter's outside surface showed a 6 °C upto 8 °C lower temperature than the standard shelter. Normally the differance would be even higher, knowing that the temperature in Adana in summer season has an average of 45 °C.

5.4.2 The air Conditioner's ON/OFF measurements :

Day 1 (April, 2nd)

During the testing on energy use at day 1 it seemed useful to see where these savings came from. On day 2 was decided to measure the on- and off time of the air conditioners from the coated,- and normal container. The results can be found below.

Day 2 (April, 3rd)

Standard Shelter			Coated Shelter (Supertherm®)		
Switch	Temperature°C	Time (minutes)	Switch	Temperature°C	Time (minutes)
on	25,5	2,22	on	25	2,25
off	19,5	3,04	off	17	5,2
on	25,4	2,25	on	25,3	2,23
off	17,5	3,08	off	15,4	5,3
on	25	2,18	on	25,1	2,21
off	18,2	3,1	off	14,9	5,35
on	25,2	2,23	on	25,2	2,23
off	17,9	3,12	off	15,5	5,1
on	24,9	2,22	on	24,9	2,26
off	17,9	3,35	off	25	5,15
on	25,5	2,26	on	24,5	2,26
off	18	3,17	off	13,9	5,2
on	25,2	2,23	on	25,1	2,22
off	17,8	3,35	off	25,2	4,55
on	24,9	2,21	on	15,9	2,23
off	17,5	3,25	off	24,9	5,1

Day 3 (April, 4th)

Standard Shelter			Coated Shelter (Supertherm®)		
Switch	Temperature°C	Time (minutes)	Switch	Temperature°C	Time (minutes)
on	25,2	2,2	on	25,2	2,22
off	18,1	3,2	off	17,2	4,25
on	25	2,24	on	25,3	2,24
off	17,1	3,2	off	17,5	4,15
on	25,2	2,3	on	25,2	2,2
off	17,1	3,35	off	17,2	4,4
on	24,6	2,25	on	25,5	2,23
off	16,6	3,2	off	17,3	4,25
on	24,6	2,22	on	25,3	2,26
off	16,9	3,5	off	17,3	4,23
on	24,5	2,25	on	25,3	2,22
off	17,7	3,49	off	17,8	4,2
on	25,2	2,21	on	25,1	2,2
off	17,2	3,35	off	17,6	4,2
on			on	25,3	2,21
off			off	17,8	4,2

5.4.3 Air Conditioner Switch ON/OFF Temperatures and Times

	Standard Shelter	Painted Shelter (Supertherm®)
	DAY 2 (April,3rd)	
Average Switch ON Temp.°C	25,2	23,9
Average Switch OFF Temp.°C	18,0	19,0
Average Switch ON Periods (Minutes)	2,1	2,2
Average Switch OFF Periods (Minutes)	3,2	5,1

	Standard Shelter	Painted Shelter (Supertherm®)
	DAY 3 (April,4th)	
Average Switch ON Temp.°C	24,9	25,3
Average Switch OFF Temp.°C	17,2	17,5
Average Switch ON Periods (Minutes)	2,2	2,2
Average Switch OFF Periods (Minutes)	3,3	4,2

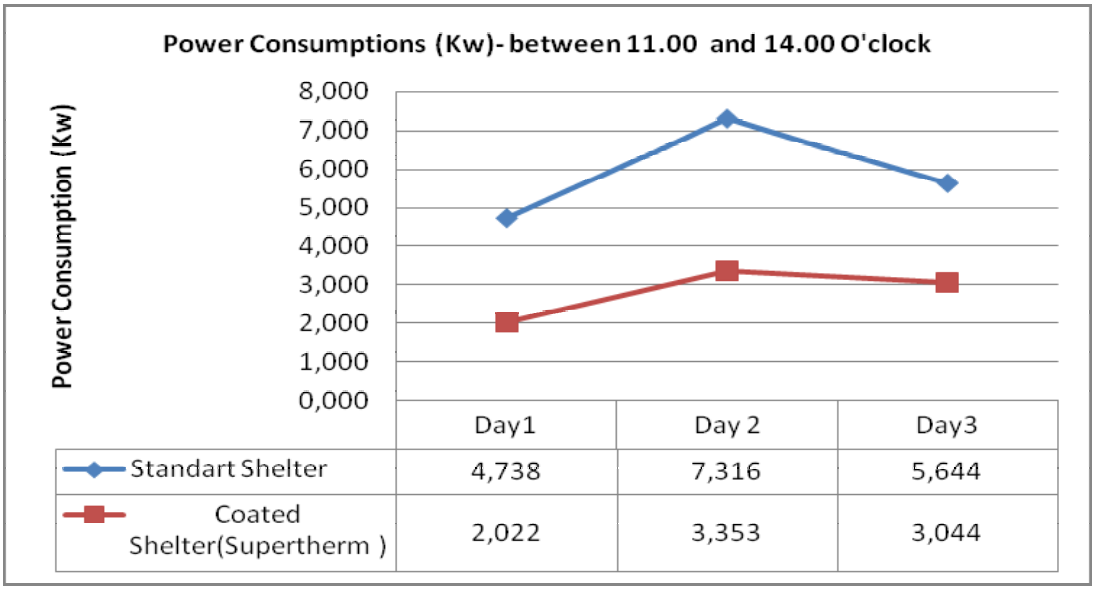
Comments

During the trial the air conditioners' ON and OFF times were also measured . The results showed that the coated shelter's AC stayed turned OFF 21% up to 38% longer, compared to the standard shelter's AC. On the other hand it is recognized that both AC's ON time based on the fix time, were not controlled by setting bottom temperatures to AC's thermostat.

5.4.4 Recorded Power Consumptions

Date	Time	Stand. Shelter kw/h	Consumption kw	Coated shelter kw/h	Consumption kw
Day 1	11:00	2776,179	-	1629,179	-
	13.00	2778,534	2,355	1630,065	0,886
	14:00	2780,917	4,738	1631,201	2,022
Day2	11:00	2826,768	50,589	1641,738	12,559
	13:00	2831,536	55,357	1644,240	15,061
	14:00	2834,084	57,905	1645,091	15,912
Day3	11.00	2872,840	96,661	1661,440	32,261
	13:00	2876,717	100,538	1663,502	34,323
	14:00	2878,484	102,305	1664,484	35,305

Daily Results 11:00-14:00	Stand. Shelter Consumption kw	Coated Shelter Consumption kw	% Difference
Day1	4,738	2,022	57,3
Day 2	7,316	3,353	54,2
Day3	5,644	3,044	46,1
		Average	52,5



Comments

The charts and diagrams above show that during the 3 days trial the coated shelter consumed an average of 52 % less power compared to the standard shelter.

5.5 Shelter pictures

Standard shelter

Supertherm® coated shelter

Both shelters at test facility of Vodafone, Adana, Turkey

6. Conclusions and Recommendations

During the trial period the weather in Adana was partially cloudy and therefore the shelters were not continuously subjected to direct sun shine. During hot summer days the difference in energy use can be even larger. During winter SuperTherm® will have less effect.

The diagrams in chapter 5.4 showed that the outer surfaces of the shelters had different temperatures. The weather temperatures were between 21 °C and 24 °C. Depending on the cloudes the coated shelter's outside surface showed a 6 °C upto 8 °C lower temperature than the standard shelter. Normally the differance would be even higher, knowing that the temperature in Adana in summer season has an average of 45 °C.

During the trial the air conditioners' ON and OFF times were also measured . The results indicate that coated shelter's AC were stayed in OFF period 21% up to 38% longer than the Standard shelter's AC. On the other hand it is recognized that both AC's ON time based on the fix time, were not controlled by setting bottom temperatures to AC's thermostat.

Most important the testing in Adana, Turkey confirmed the same energy reduction as measured in June, July and August 2007. During the 3 days trial the Coated Shelter consumed an average of 52 % less power compared to the Standard Shelter.

SuperTherm® performs best in hot, sunny climates. The climate in turkey is known for its hot summers. In cooperation with Vodafone Global, the product seems interesting to use in South Africa, Mozambique, Tanzania, Egypt, India and China. Local application should be arranged.

The period for return on investment can be calculated when local costs, like labor and electricity are known. Besides this, the size of the individual shelters will determine the quantity of SuperTherm® that is needed, 2,5 m2 per 1 liter.

Appendix 1. Test listing for SuperTherm®

1. ASTM (American Society for Testing and Materials)

C 177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus	Passed
C-236 (C236-89(1993)e1) - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box - Testing for measuring R-values	Passed
C 411 Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation	Passed
C 1371Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers and C 1549 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer	Passed
D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension	Passed
Tensile strength- 444 psi. (modulus of elasticity 13,248 psi)	
D 522 Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings	Passed
- resistance to cracking on metal or rubber type materials - 1"(25mm)bend - 1/4"(96mm)bend	
D 1653 Standard Test Methods for Water Vapor Transmission of Organic Coating Films	Passed 3%
D 1654 Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments Salt spray (fog/weathering) 450 Hour Salt Spray (Fog)	Passed - 2000 hours
D 3273-82T Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber	
D 3274 Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation	Passed
- Rating degree of fungal growth or soil and dirt accumulation on paint film	Excellent (8 out of 9)
D 3359 Standard Test Method for Measuring Adhesion by Tape Test	Rated: 5B
D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser	Passed
D 6904 Standard Practice for Resistance to Wind-Driven Rain for Exterior Coatings Applied to Masonry	3000 cycles

D 7088 Standard Practice for Resistance to Hydrostatic Pressure for Coatings Used in Below Grade Applications Applied to Masonry	Passed
E 84-89a Standard Test Method for Surface Burning Characteristics of Building Materials - Flame Index "0" - Smoke Index "0" - Class "A" Rating (or Class "1" or Class "I")	Passed - "0" development
E 90 Standard test method for laboratory measurement of airborne sound transmission loss of building partitions	Passed
E 96 Standard Test Methods for Water Vapor Transmission of Materials water vapor transmission	Perm Rating - 8.8 avg
E 108 Standard Test Method for Fire Tests of Roof Coverings	Passed
E 413 Standard Classification for Determination of Sound Transmission Class	STC 40
E 514 Standard Test Method for Water Penetration and Leakage Through Masonry Resistance to Wind Driven Rain	Passed
E 903-96 Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres E 903-96 4 Year Retest	Passed
E 1269 Standard Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry - TPRL	Passed - blocking 99% of heat BTU conduction
E 1461-92 Standard Test Method for Thermal Diffusivity of Solids by the Flash Method	Passed
VTEC Laboratories review of TPRL report	Letter stating RE19
Thermo physical Properties Research Laboratory	Letter stating equal to R19
E1737 Test Method for J-Integral Characterization of Fracture Toughness Flexibility	Passed
G 53 exposure to UV, elevated temperature and humidity	Passed

2. NASA (National Aeronautics and Space Administration) Passed

NHB 8060.1B/C Test 1 Flammability testing
- "0" Burn, Class "A" rating

NHB 8060.1C, Test 7 Toxic Off gassing

- "K" no Toxic off gassing
- "K" Rating for toxicity

Tests performed at Marshall Space Flight Center

3.ICC Approval (International Code Council)

ES ICC Legacy Report #21-25

Council that formally consolidates approvals for:
BOCA (Building Officials Code Administrators)
- Section 723.2 Exposed installations, Thermal insulation
- Section 723.3 Concealed installations, Thermal insulation
- Section 803.2 Classification, Interior finish
- 1998 International Mechanical Code
- Section 604.3 Coverings and Linings, Insulation
- BOCA International Evaluation Report

ICBO (International Conference of Building Officials
SBCCI (Southern Building Code Congress International)
- Passed ASTM E 84 For Flame Spread
- Passed ASTM C 411 for High Temperature for Surface Performance
- Passed ASTM C 177 for Thermal Conductivity

(*SUPER THERM ® Specific)

4. ASHRAE 90.1 CODE COMPLIANCE

(“U” value used to measure “area-weighted average”, insulated walls or roofs)

5. ECAP-CUL-1-03 - ENERGY CONSERVATION ASSISTANCE PROGRAM

- Standard Method for Comparing Utility Loads in Standard Constructed Buildings

6. ENERGY STAR PROGRAM

Approved partner

- Approved and accepted as an energy star partner for saving energy.
- ASTM E 903-96 Reflectivity=80%
- Only 1% Reduction in Reflectivity over 3 Years (3% over 10 years)

ASTM C 1371 and C 1549 Solar Reflectance and Thermal Emittance

7. LEED - Leadership in Energy & Environmental Design	Approved product
- Qualifies under Sustainable Sites Credit 7.1 Heat Island Effect - non roof	1 point
- Qualifies under Sustainable Sites Credit 7.2 Heat Island Effect - roof	1 point
- Qualifies under Energy and Atmosphere Credit 1 Optimize Energy Performance *ie. reduce thermal bridging*	1 - 10 points
- Indoor Environmental Quality Credit 4.2 Low Emitting Materials - paint	1 point
- Innovation & Design Process Credit 1.1 Innovation in Design	1 - 5 points
- MBDC Cradle to Cradle GOLD CERTIFICATION	
ASTM C 1371 and C 1549 Solar Reflectance and Thermal Emittance	

8. DNV Certification — Passed

- Passed DNV Audit and DNV Compliant
- Approved for worldwide salt water and Maritime use
- Complies with DNV's Interpretation of SOLAS 1974 Convention as Amended
- Low Flame Spread material, not generating excessive quantities of smoke nor toxic products in fire.
- DNV rules for Classifications of Ships and Mobile Offshore Units

9. Factory Mutual Approval — Passed

-Tested and Approved for Roofing and all other Applications

*Superior Products International II, Inc. is an active member of the NRCA.
(National Roofing Contractors Association)

10. Japanese Industrial Standards — Passed

- JIS A 5759 Reflectivity of sunlight on window or coating film
- Reflective ratio 92.2 - Long Wave Radiation ratio 99.5 (Infrared)
- 15 Year Re Test Solar Reflectance JIS R 3106

11. USDA (United States Department of Agriculture) — Passed

- Environmentally safe and safe for use around animals
- Letter of Written Certification as Accepted by USDA from Manufacturer

12. CFIA (Canadian Food Inspection Agency) — Passed

13 . China Center for Technical Testing of Non-Metallic Materials for Ship Building, China Ship-Building Corporation.

National Bureau for the Inspection of Technologies (97) Measurement Approval (National) No. (M0729)	Passed - 2000 hours Salt, UV, Weathering.
GB/T 1771-91 - Resistance to Salt Fog (2000 hours)	Passed
GB/T 1866-88 - Manual Aging (2000 hours)	Passed
GB/T 10834-88 - Resistance to Salt Water (1000 hours)	Passed
GB/T 5219-85 - Adhesion (pulling apart method)	4.07MPa
GB/T 1733-93 - Boiling Water Immersion	8 Hours

14. SOUND PROOFING Barrier — STC-Rated 48-51

- Sound Reduction: STC (Sound Transmission Coefficient) - Rated 48-51 as per ASTM E 90
- Stoughton Trailer Ultra Sound testing shows a 68% Reduction
- Sound testing performed by Hot-Cold Air and Fire Control by Pat Saulson, PhD
- Sound reduced an average of 50.2% by using SUPER THERM on the interior walls of a house

15. INTERNATIONAL MARITIME ORGANIZATION — Passed

IMO A. 653 (16)
-Flame Spread Test for Bulkhead, Wall, and Ceiling Linings

16. Marine Safety Council — Passed

MSC.41 (64) - Toxic Gas Generation
- Used Colorimetric Gas Detector Tubes
- Met All Toxic Gas Requirements

17. CALIFORNIA COOL ROOF PROGRAM — Approved

18. State of California bureau of Home Furnishing and Thermal Insulation — License Number TE 1392

Appendix 2. TUV Report (to be obtained separately)