

Just coat it and save energy!

# MIRACOOOL™

## Solar High Reflective Coating



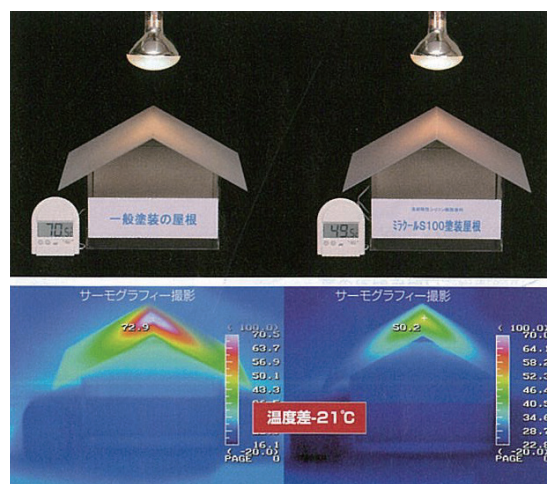
# MIRACOOOL CAN REDUCE SURFACE TEMPERATURE OF BUILDINGS AND FACILITIES THAT ARE EXPOSED TO SOLAR RADIATION.



## How does solar radiation affect the surface temperature and heat flow through the roof?

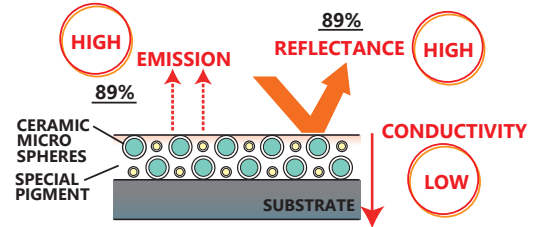
When the roof surface is exposed to the sunlight, part of the solar radiation is reflected away by the surface substrate and the rest is absorbed. The absorbed solar radiation heats the roof surface, and the heated surface partially emits radiation in the far infrared part of the spectrum. The rest of the absorbed energy passes through the roofing material into the room, which increases the room temperature consequently. MIRACOOOL is designed through the state-of-the-art technology to have very high reflectance and extremely high emission of solar radiation, and low heat conductivity in order to minimize the heat flow into the room.

We have a vast of experiences and job records with regard to High Reflective Coating i.e. MIRACOOOL Series in Japan. Now, we are very pleased to introduce MIRACOOOL to other countries.

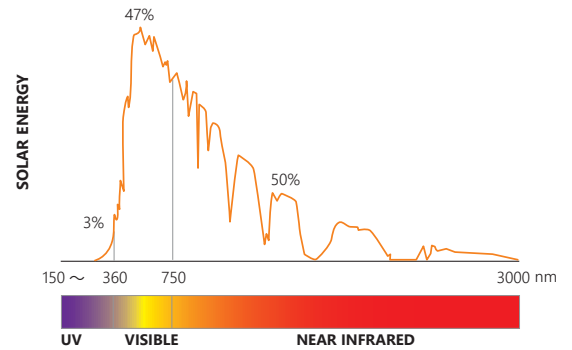




## SECTIONAL VIEW OF DRY FILM OF MIRACOOOL COATING

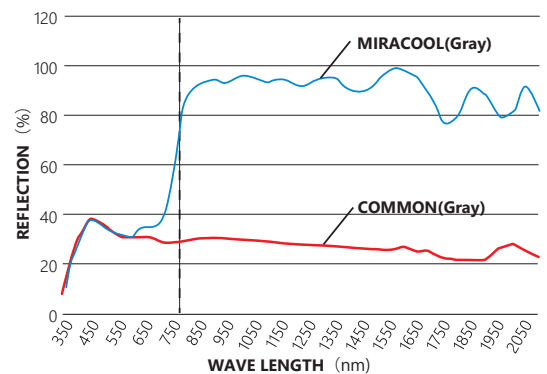


## SOLAR SPECTRUM



The sun is burning at 5,700 degrees Kelvin, radiating solar energy to the earth. In the solar radiation, energy of the ultra violet ray accounts for only 3%, energy of the visible ray accounts for 47%, and the rest 50% of energy is in the infrared ray. Our target is to reflect the infrared ray as much as possible.

## REFLECTION OF INFRARED



This graph shows the reflection rates of the 2 paints at every wave length of the solar spectrum.

Both paints have the similar reflectance in the visible area, around 35%, which means both look as Gray in the human eye.

However there is a remarkable difference in the infrared area between the 2 paints: Miracool marks much higher reflection than a normal paint. This causes the difference of the temperature of the painted surface.

## BENEFITS

### Reduction of surface temperature

Reduce cooling load and cost of air-conditioning systems up to 40 % in hot seasons. In a room without air-conditioning systems, the room temperature can be dropped by up to 10 degree C. That helps working environment and quality control of stored goods.

### Protection of surface material

Extend the life of existing roofing materials.

### Reduction of thermal shock

Reduce heat expansion of roofing materials that may cause loud noises.

### Extraordinary weathering resistance

Reduce the maintenance cost of buildings.

### Abundant color variation

- Cool White
- Cool Gray
- Pastel Blue
- Light Green
- Orange Pink
- New Ivory
- Coral Brown

\*This sample is printed matter so it differs somewhat from the actual product.

# MIRACOOOL realizing bold temperature reduction of building simply by painting

## DATA OF REDUCING ROOM TEMPERATURE (With/Without MIRACOOOL)

### Folded Plate Roofing At a facility operated by Company A in Hanoi, Vietnam temperatures reached 40.0°C .



#### Building Structure

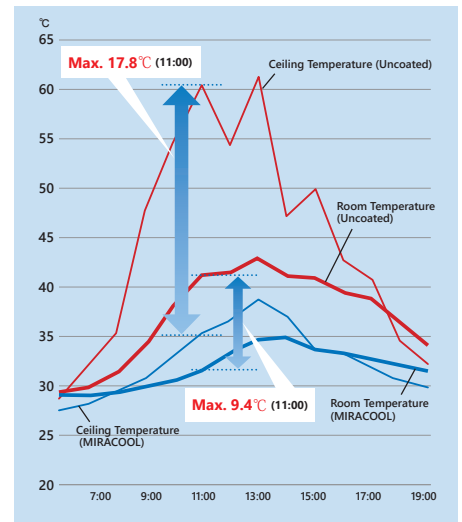
Steel-framed structure with colored folded plate roofing.

#### Temperature Measurement

Temperature at the inside surface of the roof on the left side and room temperatures near the ceiling were measured by continuous recording thermometers.

#### Proven Effective in Reducing Both Loft Space and Room Temperatures

We compared room temperatures inside buildings with folded plate roofing, one before and the other after application of MIRACOOOL coating on the days when ambient temperature was almost the same. The difference in room temperature was 8.0°C. This demonstrates MIRACOOOL's effectiveness in reducing temperatures inside buildings with folded plate roofing.



### Concrete Roofing

At an elementary school in Tokyo on August 21, temperatures reached 35.8°C .



#### Building Structure

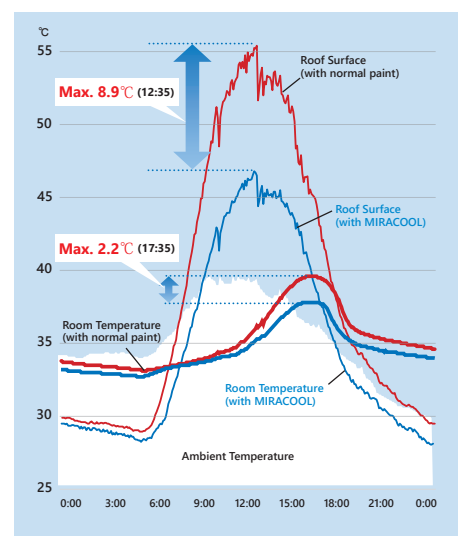
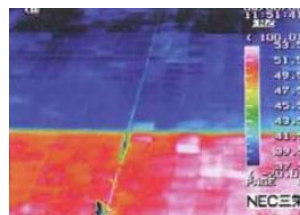
RC structure with RC roof covered with waterproof layer and roof mats, with air layer and suspended ceiling.

#### Temperature Measurement

Roof surface temperature and room temperature at a point 1.6 m above the floor were measured by continuous recording thermometers.

#### High Solar Reflectance Proven for Concrete Roofs

To compare roof surface temperature and room temperature, one section of the roof was coated with MIRACOOOL (N6 Gray) and another section with normal paint of the same color. While the effectiveness of coatings on concrete roofs has been known to be relatively modest, the measured difference in room temperature was 2.2 °C . This demonstrates MIRACOOOL's effectiveness in reducing room temperature, even for concrete roofs.





# DATA OF SAVING ENERGY (Comparison of Electric Energy Consumption)

**Fodled Plete Roofing** Location of facility: Warehouse in Saitama city, Saitama Prefecture



## Achieved reduction of electricity consumption in the summer before and after painting

We compared electricity consumption for air conditioning during the summer at a warehouse to which MIRACOOOL coating had been applied in 2013.

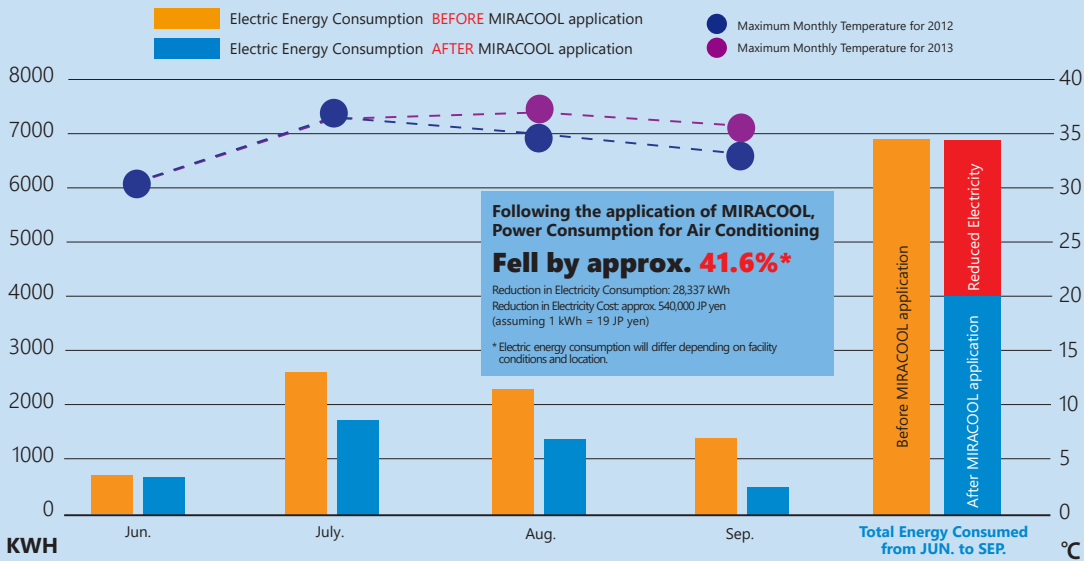
While the maximum ambient temperature conditions were nearly the same for the summers of 2012 and 2013, MIRACOOOL coating dramatically reduced energy consumption.

This shows MIRACOOOL is extremely effective in saving energy.

Roof surface area: approx. 2,350 m<sup>2</sup>  
 Coating: MIRACOOOL (Cool White)  
 Date of application: April 2013  
 Roof structure: colored folded plate roofing (t = 0.8 mm)  
 Insulation material: anticondensation insulation (t = 5 mm)

## Comparison of Electric Energy Consumption for Air Conditioning in Summertime

Not only did MIRACOOOL cut electricity consumption, it also achieved room temperatures of 26–27°C when the air conditioning is set to 26°C, in contrast to a temperature of around 30°C achieved for the same setting before MIRACOOOL application, thereby creating a more comfortable workplace environment. Furthermore, the cost of electricity usage has also been significantly reduced.





# MIRACOOOL is actual achievements in various applications

## Roofs of commercial facilities



(Japan)

*Coating applied to Over 8,000,000 m<sup>2</sup>*



(Japan)

## Roofs of office & school



(Guam)

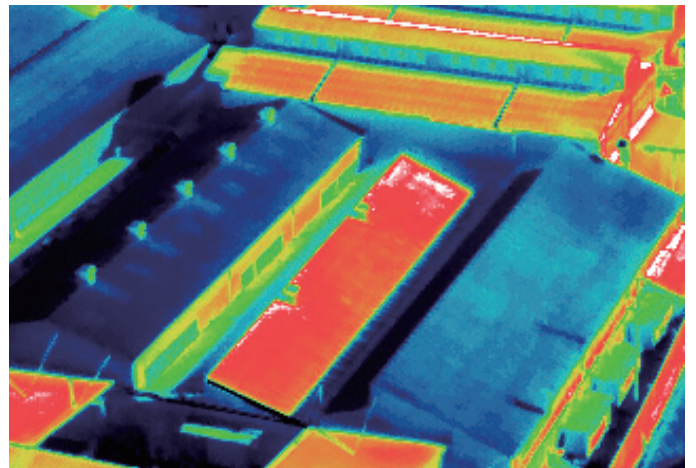


(Philippines)

## Roofs of factory



(Japan)



(Japan)



Roofs & Walls of warehouses



(Japan)



(Japan)

Roads



(Japan)



(Singapore)

Courts



(Singapore)

Cubicle



(Japan)





# APPLICATION PROCEDURE FOR MIRACOO SW200

## Procedure for "Steel Roof " made of PCM (except fluorine coating)

Process	Product Name	Coating Method	Standard Coverage (g/m <sup>2</sup> /time)	Coating Interval at 30°C	Dry Film Thickness (μm)
Surface Preparation	Remove rust thoroughly. Clean stain and dust by high pressure water jet.				
Primary Coat	Local anti-rust epoxy resin primer suitable for metal sheet. (White or very pale color)	According to manufacturer's standard			
The First Coat	MIRACOO SW200 100 Water 0~10	Paintbrush, roller or spray	110 ~ 125	8hr ~ 1week	Approx. 22 ~ 25
The Second Coat	MIRACOO SW200 100 Water 0~10	Paintbrush, roller or spray	110 ~ 125	—	Approx. 22 ~ 25

## Procedure for "Concrete or Mortar Roof "

Process	Product Name	Coating Method	Standard Coverage (g/m <sup>2</sup> /time)	Coating Interval at 30°C	Dry Film Thickness (μm)
Surface Preparation	Clean stain and dust by high pressure water jet.				
Sealer	Local sealer suitable for concrete and mortar surface	According to manufacturer's standard			
The First Coat	MIRACOO SW200 100 Water 0~10	Paintbrush, roller or spray	110 ~ 125	8hr ~ 1week	Approx. 22 ~ 25
The Second Coat	MIRACOO SW200 100 Water 0~10	Paintbrush, roller or spray	110 ~ 125	—	Approx. 22 ~ 25

## AWARD



Environmental Technology Verification [ETV] program, organized by Ministry of the Environment of Japan, is a program to test usable "advanced environmental technology" for evaluation purposes. Technological effects are verified in the form of objective data. Our products are verified in the "Heat-island mitigation technology field" for reducing air conditioning loads by using building envelope systems.

## PATENT

	Patent number
JAPAN	4118090
JAPAN	4401171
JAPAN	4672589
JAPAN	3794824
JAPAN	3794837
THAILAND	28271
CHINA	ZL 01 1 22013.9
MALAYSIA	MY-136929-A
HONGKONG	HK1041281B

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