State-of-the-art nano-coating agents & special paints

15% or more Energy-saving plan for air conditioning costs.
Rust prevention, heat insulation, antifouling shield

THERMAL PAINT for outdoor unit

Waterproof auxiliary & rust-proof coating for outdoor unit and its surroundings
「**Rust Shield**」

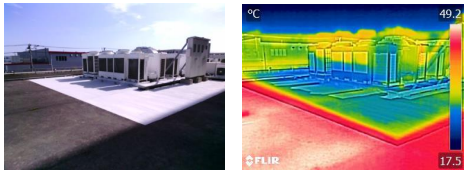
+

Thermal Paint for outdoor unit and its surroundings
「**Thermo ECO Shield**」

+

Antifouling and maintaining reflectance for outdoor unit and its surroundings
「**Super Glass Barrier**」

Before　After



Uncoated ＆Coated

Coated　Uncoated

Sketch Nano.Ph
Thermal Paint　Heat & UV Cut Coat　Anti-fouling Coat

What is the thermal coating for outdoor unit and surroundings?

Thermo ECO Shield application system achieves Rust prevention, heat insulation and antifouling shield.
As a result, the load on the compressor is reduced leading to **energy savings of 15% or more. .**

THERMAL PAINT for outdoor unit

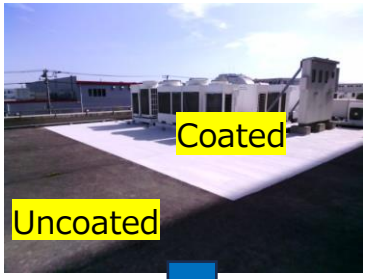
waterproof auxiliary
& rust-proof coating
「**Rust Shield**」

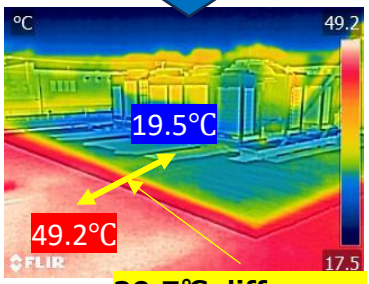
＋

Heat Reflection
& Thermal insulation Paint
「**Thermo ECO Shield**」

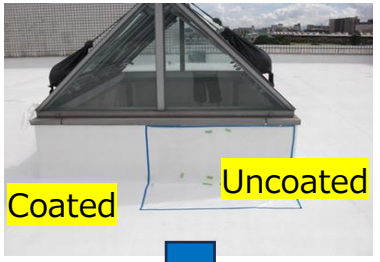
＋

Anti-Static, Super Hydrophilic
Antifouling Coat
& maintaining reflectance
「**Super Glass Barrier**」





29.7℃ difference



1 year later

Application Record 1





2023年5月20
（鹿児島県）

2023年5月21日 愛野店
（長崎県）335.15㎡

Drug Store Mori, 127 shops
On February~May in 2023






2023年5月21日 小浜店
（長崎県）119.53㎡

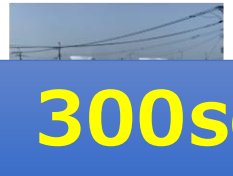
2023年5月21日 早苗店
（長崎県）149.15㎡

2023年5月21日 広田店
（長崎県）330.7㎡

2023年5月21日 鹿屋川西店
（鹿児島県）257.8㎡

2023年5月21日 西出水店
（鹿児島県）244.28㎡



Approximately 300sqm~350sqm
of coating area per a shop






2023年5月22日 喜入店
（鹿児島県）377.51㎡

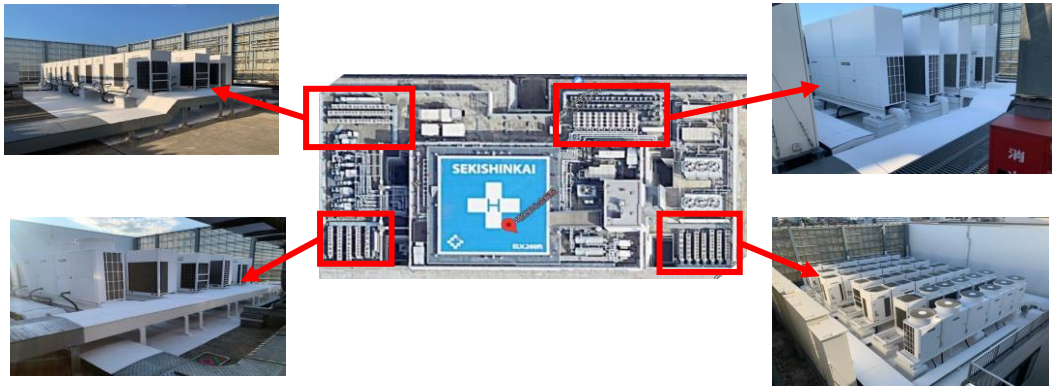
2023年5月22日 阿蘇一ノ宮店
（熊本県）130.97㎡

4日 東諫早
327.7㎡

Hospital rooftop outdoor unit and surrounding heat shielding/thermal insulation Paint

Saitama Sekishinkai Hospital

1586 sqm was carried out on Oct~Nov,2022



Tokyo West Tokushukai Hospital

538.88 sqm was carried out during Aug,2022

Kansai Electric Power

Kansai Electric Power Co., Inc. Kyoto Branch
Engineering Group Leader Masanobu Nishimura

Verification equipment

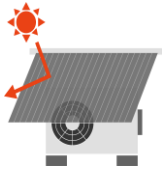
- Rooftop outdoor unit (2 units)
- Cooling capacity (22.4KW/unit)
- Power consumption (6.1kW)
- Set room temperature (29℃)

Measuring method

Measure the power and current of the outdoor unit, as well as the intake air temperature of the unit, the current of the outdoor unit, and the temperatures in the rooftop and ceiling space at one-minute intervals.

Additionally, use infrared thermography to measure the temperature distribution of Please note that while taking measurements, consider the influence of wind speed from meteorological data and compare the measurement data of days with similar meteorological conditions in terms of temperature and sunlight exposure between days with countermeasures and days without countermeasures.

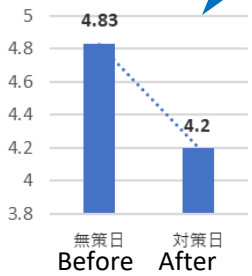
1



The shading (shadowing) effect on the outdoor unit due to solar radiation.

Surround the outdoor unit with a shade net (with 85% shading rate).

Reduce the power consumption by 10% (0.63 kWh).

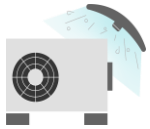


At 12:00 PM in the area without installation, the power consumption was 4.83 kWh, while at 2:00 PM in the area with installation, the power consumption reduced to 4.20 kWh, confirming a 10% energy-saving effect.

Issues

A structure that can withstand typhoons and strong winds is required

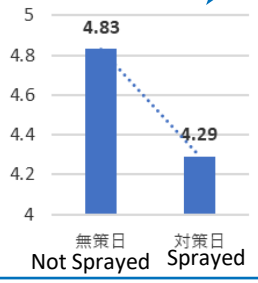
2



Sprinkling water to the outdoor unit (4L/h)

Attach a mist nozzle to the heat exchanger of the outdoor unit.

Power consumption reduced by 10% (0.54kWh)

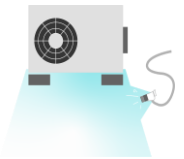


During the 12:00 PM time slot, the area without water spraying had a power consumption of 4.83 kWh, while the area where water was sprayed had a power consumption of 4.29 kWh, confirming a 10% energy-saving effect.

Issues

If the watering amount is insufficient, It may occur:
- Adhesion of residue due to evaporation.
- Decreased heat exchange ratio and COP (Coefficient of Performance) due to scale deposition on the heat exchanger.
- Rust prevention measures for equipment are also essential.

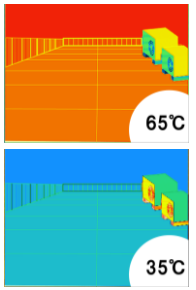
3



Watering around the outdoor unit and rooftop floor (at a rate of 7L/m).

Install a sprinkler tube on the rooftop and continuously water it with tap water.

Achieve a 20% reduction in power consumption (with a 30°C temperature difference).



Compare the average current and confirm a **nearly 20%** energy-saving effect.

Possible factors to consider:
- Lack of insulation in the rooftop and ceiling area, leading to significant suppression of temperature rise in the ceiling area.
- Decreased temperature around the outdoor unit installed on the rooftop, resulting in a lower intake air temperature for the outdoor unit.

Issues

Due to the significant amount of water usage:
- Increased power consumption for the water lifting pump to supply water to the elevated water tank.
- Increased costs such as water consumption.

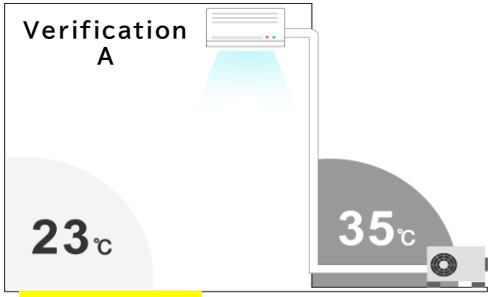
Electric Power Research Institute (EPRI)

Verification purpose

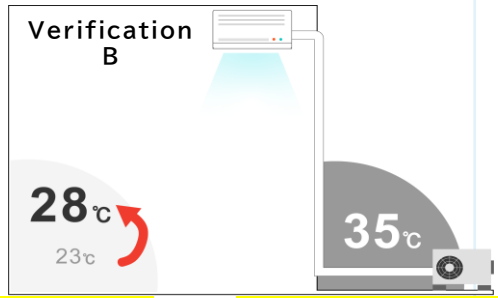
Air Conditioning Unit: we will verify the energy-saving effect by adjusting the indoor air conditioner's set temperature and the intake temperature of the heat exchanger around the outdoor unit.

Measuring method

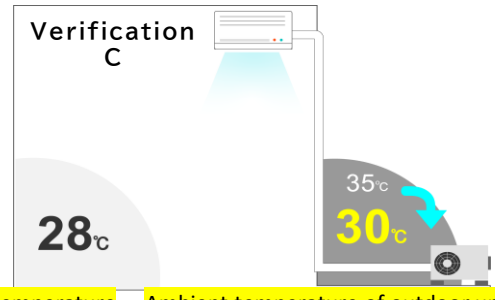
We conducted an experiment using an air conditioner installed in our Akagi Test Center's experimental house. The indoor set temperatures were set to 23° C and 28° C, while the temperatures around the outdoor unit were set to 35° C and 30° C. We applied a heat load of 2.3 kW and measured the power consumption. The air conditioner used in the experiment had a rated cooling capacity of 2.2 kW and a rated COP of 5.57 (with a rated power consumption of 395 W during rated operation)



If the ambient temperature of the outdoor unit is 35°C and the indoor temperature is 23°C, the power consumption is 450W.



When the room temperature was raised by 5℃, the power consumption decreased by 128W compared to A.



Lowering the ambient temperature of the outdoor unit by 5°C reduced power consumption by 135W compared to B.

Verification A	power consumption 450w	28%Down	Verification B	power consumption 322w	42%Down	Verification C	power consumption 187w
		58%Down					

Energy-saving effect by reducing the ambient temperature of the outdoor unit

Based on the above results, lowering the ambient temperature of the outdoor unit is effective for power saving.
One way to lower the temperature around the outdoor unit is by applying heat-insulating paint to both the outdoor unit itself and its surroundings.
This can effectively reduce the overall temperature and significantly reduce power consumption.

A certain convenience store in Japan.

Verification purpose

Verification of energy-saving effects through heat-insulating paint applied only to the outdoor unit.

Measuring method

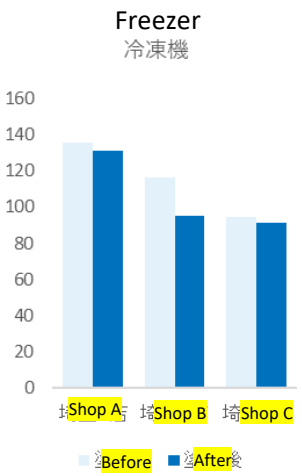
It applied heat-insulating paint to the outdoor units of three specific convenience stores and measured the changes in electricity consumption.

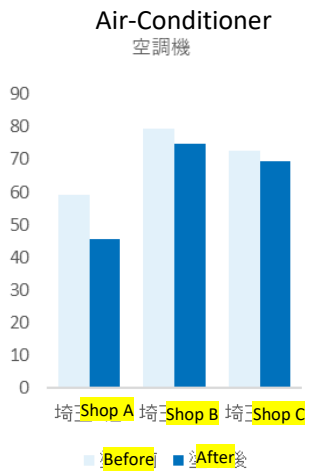
Energy-saving effects of reducing the temperature of the outdoor unit

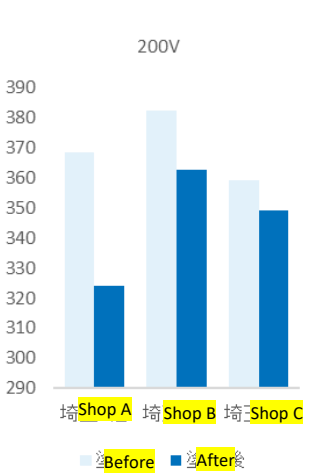
Energy-saving effects were observed even with heat-insulating paint applied only to the outdoor unit. In particular, the convenience store with the outdoor unit facing southwest and directly exposed to sunlight, referred to as "Saitama Store A," demonstrated the highest energy-saving rate.
The average energy savings across the three stores were as follows:
- Freezer: -9.7 kWh - Air conditioner: -6.9 kWh - Main power supply (200V): -22.5 kWh (-6.6%)
Please note that the values provided represent the energy savings achieved through the application of heat-insulating paint to the outdoor unit only.

Here are the changes in electricity consumption before and after the application of heat-insulating paint for each store

Shop	Equipment	Electricity usage		Reduction rate (kwh)	Reduction rate (%)
		Before (6/17)	After (7/21)		
Shop A In Saitama	Freezer	135.4	131.1	-4.3	-3.2
	A/C	59.0	45.8	-13.2	-22.3
	200V	368.4	324.1	-44.3	12.0
Shop B In Saitama	Freezer	116.2	94.9	-21.3	18.3
	A/C	79.3	74.7	-4.6	-5.8
	200V	382.2	362.6	-19.6	-5.1
Shop C In Saitama	Freezer	94.7	91.2	-3.5	-3.7
	A/C	72.7	69.6	-3.1	-4.3
	200V	359	349.1	-9.9	-2.8



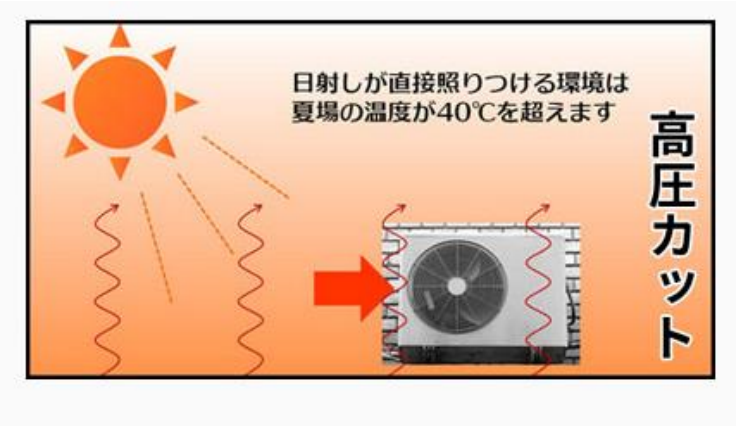


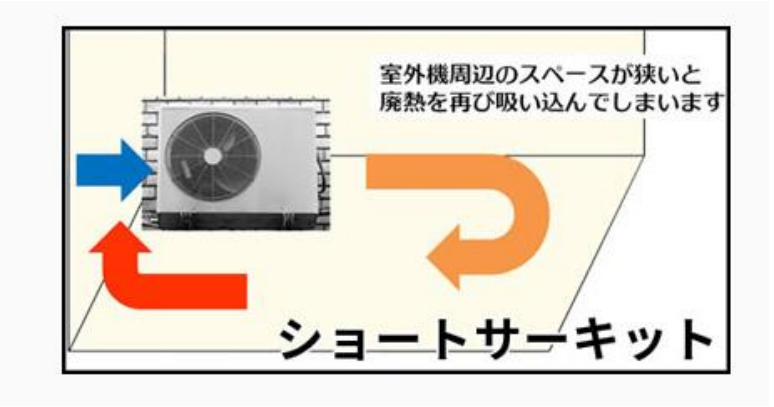


What is high-pressure cutting? Problems with high-pressure cutting

・高圧カットとは、室外機から室内機(エアコン・冷凍冷蔵ショーケース)へと送られる冷媒に対する圧力が過剰に高まり、
安全のため緊急停止＝異常停止を起こすトラブルを言います。(ショートサーキットも含む)
A high pressure cut is a problem that occurs when the pressure of the refrigerant sent from the outdoor unit to the indoor unit (air conditioner or refrigerated/freezer showcase) becomes excessive, causing an emergency stop for safety reasons (including a short circuit).

・室外機及び周辺が高温になりすぎると冷媒を冷やしきれなくなり高圧カットが発生します。
- If the outdoor unit and its surroundings become too hot, the refrigerant cannot be cooled sufficiently and a high pressure cut will occur.





高圧カットは繰り返し、繰り返すほど電力消費を多くすることで、負荷が多くなり、設備の寿命も短くなります。

The higher voltage cuts are repeated, the more electricity is consumed, which increases the load and shortens the lifespan of the equipment.

負荷を軽減し、機器の効率を上げれば節電及び省エネ対策になります。

Reducing the load and increasing the efficiency of equipment will help save electricity and energy.

Harmful effects of outdoor unit energy saving and high pressure cut measures

Silica adhesion problem caused by water sprinkling
⇒ Significant deterioration of outdoor unit




Other companies also apply heat-insulating paint to their outdoor units, but their product degrades faster over time causing rust and dirt accumulation causing the deterioration Of the unit and poor efficiency.


Also, the outdoor unit is hot to the touch so it is not effective.

- Problems with paint performance
- Problems with thin film thickness during application

The above problems are thought to be the cause.

3 steps of coating for Thermal paint

First coat「Rust Shield」

1 **Anti-Rust**

:Long-term anti-rust effect with special epoxy resin

2 **Auxiliary waterproof**

:The special epoxy resin plays an auxiliary role in preventing rain and water leaks.

+

Second and Third coat 「Thermo ECO Shield」

3 **High reflection**

: Shields direct solar heat with a high reflectance of 85% or more
= Significant reduction in air conditioning costs in summer!

4 **Heat insulation**

:Uses 12% of special hollow silica beads, the highest in the industry. Significantly improved heat insulation in summer and winter

5 **Sound insulation**

: Suppresses the noise of the outdoor unit and reduces leaks.

+

Topcoat 「Super Glass Barrier」

6 **Antistatic and antifouling performance**

:Mainly reduces adhesion of inorganic dirt such as yellow sand and volcanic ash.

7 **Super hydrophilic antifouling performance**

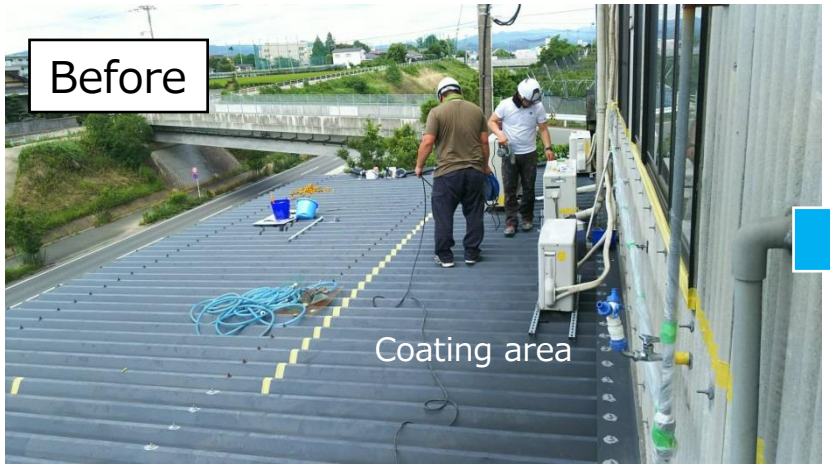
:It rinses away dirt with rain or running water.

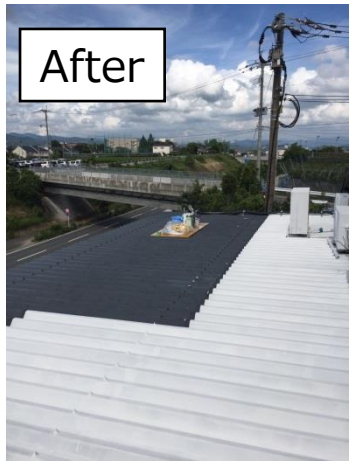
8 **Maintain infrared reflectance**

:Excellent antifouling performance continues to maintain high reflectance. 10% to 15% reduction in infrared reflectance without coating.

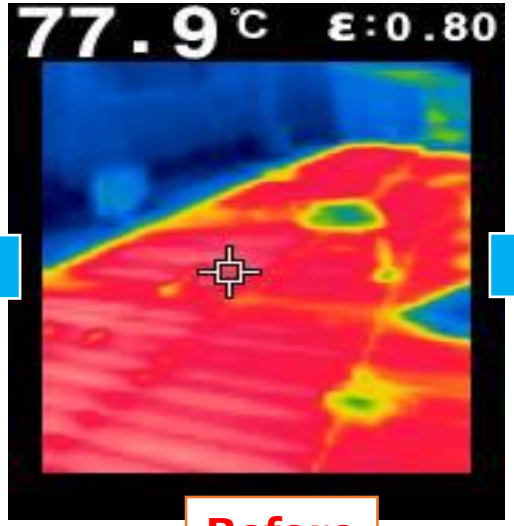
Temperature difference example

■ Date： July 2017
■ Area : The roof top of Tea shop office in Fukuoka-ken, Japan

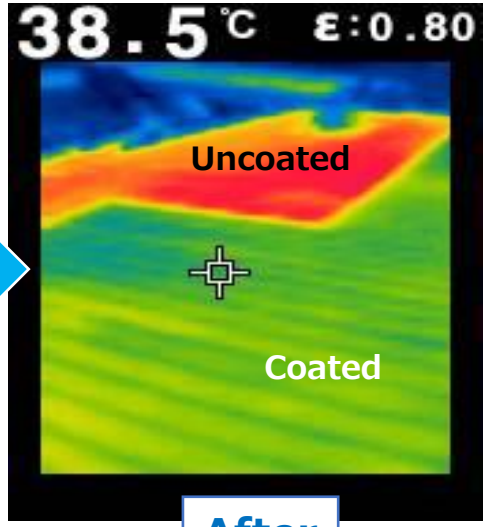




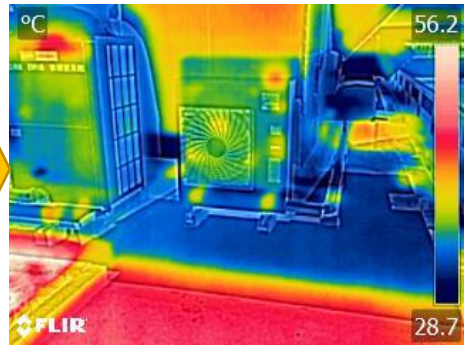
-35.5℃

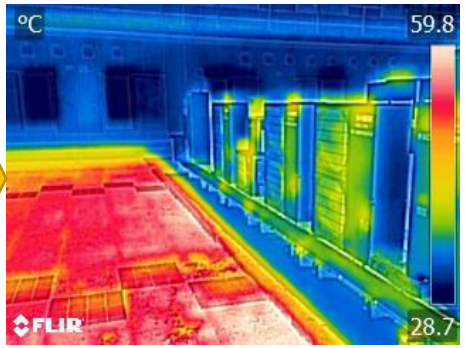


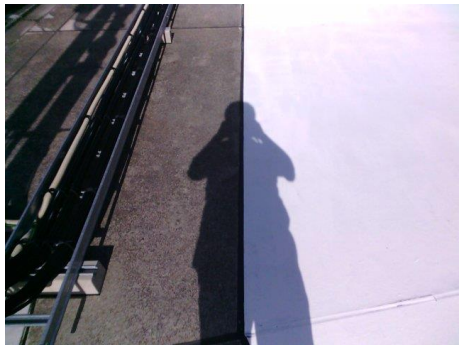
-39.4℃

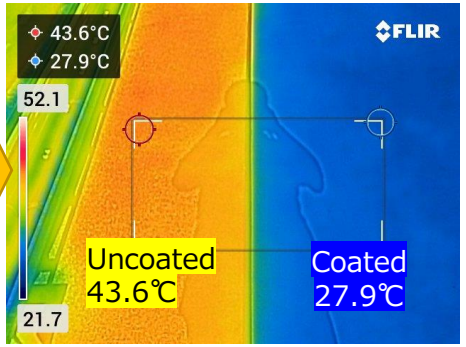


Temperature comparison after application



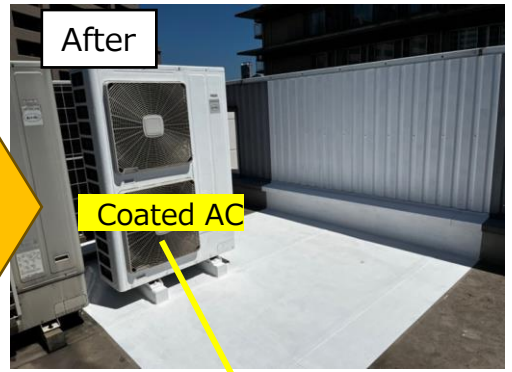


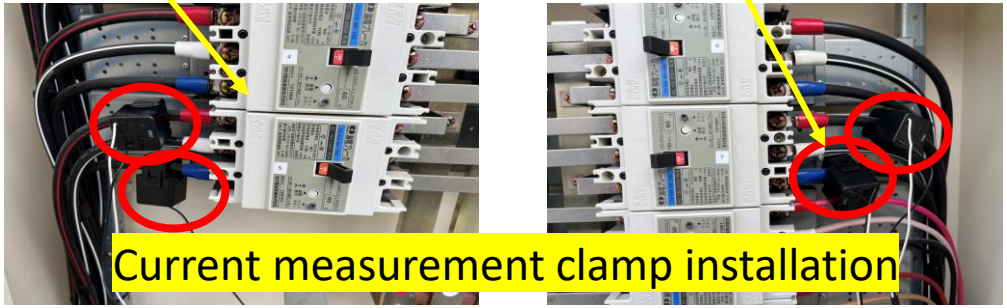


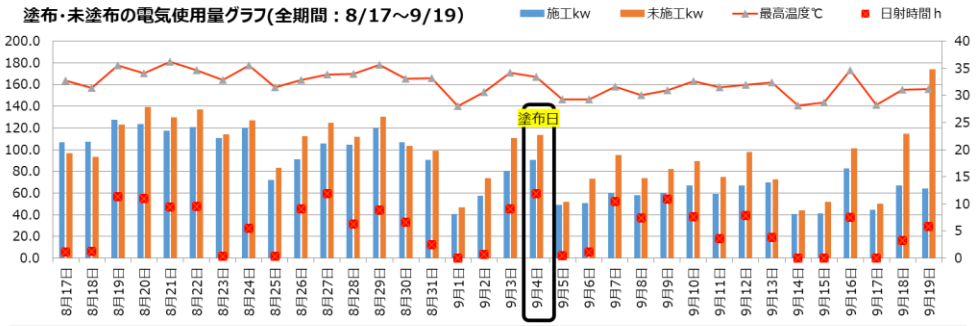


Outdoor unit painting - Free test coating, electricity usage monitoring using logger measurement

Recruiting only 10 companies for installation monitors







	施工前																		施工
日付	8月17日	8月18日	8月19日	8月20日	8月21日	8月22日	8月23日	8月24日	8月25日	8月26日	8月27日	8月28日	8月29日	8月30日	8月31日	9月1日	9月2日	9月3日	9月4日
施工kw	106.7	107.4	127.5	123.4	117.4	120.7	110.8	120.4	72.0	91.1	105.6	104.4	119.7	106.9	90.6	40.4	57.5	80.3	90.5
未施工kw	96.7	93.4	122.8	139.4	129.9	137.2	114.2	127.2	83.3	112.6	124.9	111.6	130.3	103.6	99.1	47.1	73.8	110.9	113.3
最高温度℃	32.7	31.4	35.5	34.1	36.2	34.6	32.8	35.5	31.5	32.9	33.9	34	35.7	33.1	33.2	28	30.6	34.2	33.4
日射時間h	1.1	1.2	11.3	11	9.4	9.5	0.3	5.5	0.3	9.1	11.9	6.3	8.8	6.6	2.5	0	0.7	9.1	11.9

	施工後														
日付	9月5日	9月6日	9月7日	9月8日	9月9日	9月10日	9月11日	9月12日	9月13日	9月14日	9月15日	9月16日	9月17日	9月18日	9月19日
施工kw	48.8	50.5	60.1	57.8	60.4	66.7	59.3	67.1	69.6	40.7	41.0	82.6	44.3	67.1	64.3
未施工kw	52.1	73.1	95.0	73.8	82.1	89.3	75.1	98.1	72.8	44.1	52.0	101.1	50.2	114.8	174.1
最高温度℃	29.3	29.3	31.6	30.1	30.9	32.6	31.5	31.9	32.4	28.1	28.7	34.7	28.3	31.1	31.2
日射時間h	0.5	1.1	10.4	7.4	10.9	7.6	3.6	7.8	3.8	0	0	7.5	0	3.3	5.8

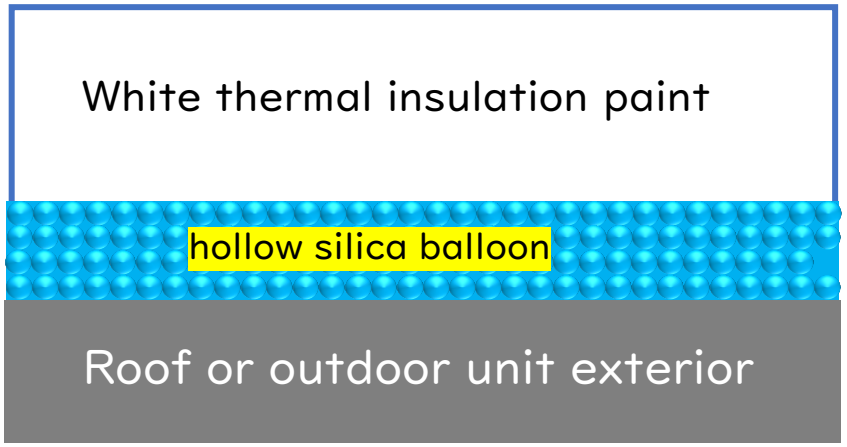
Energy saving 15.4%

2 reasons why the heat shield and insulation performance is superior to other products

●Reason 1：The higher the hollow bead content, the higher the insulation performance.

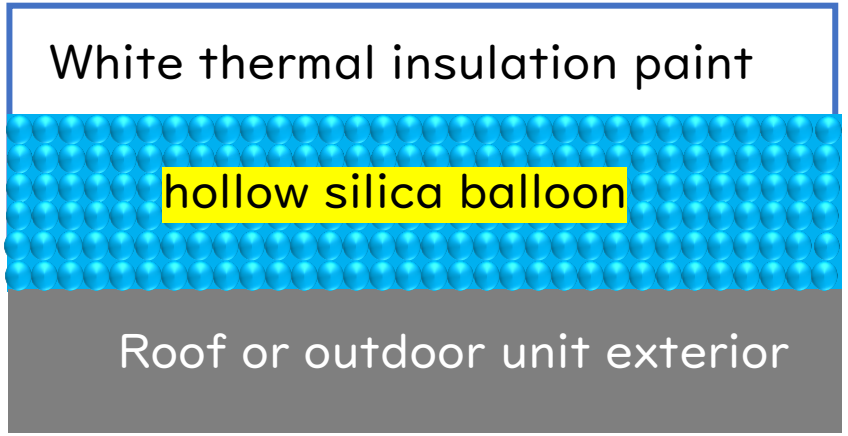
Thermo Eco Shield contains 12% hollow beads in the paint (60% in the paint film after application), which is more than twice that of other companies.

Competitor's thermal insulation paint



Assuming that the film thickness of the entire coating film is 300μm,
The film thickness of the hollow beads is 90-120μm.(30-40% of total ratio)

Thermo ECO Shield



In a film thickness of 300μm,
Hollow bead film thickness 180μm
(60% of total ratio)

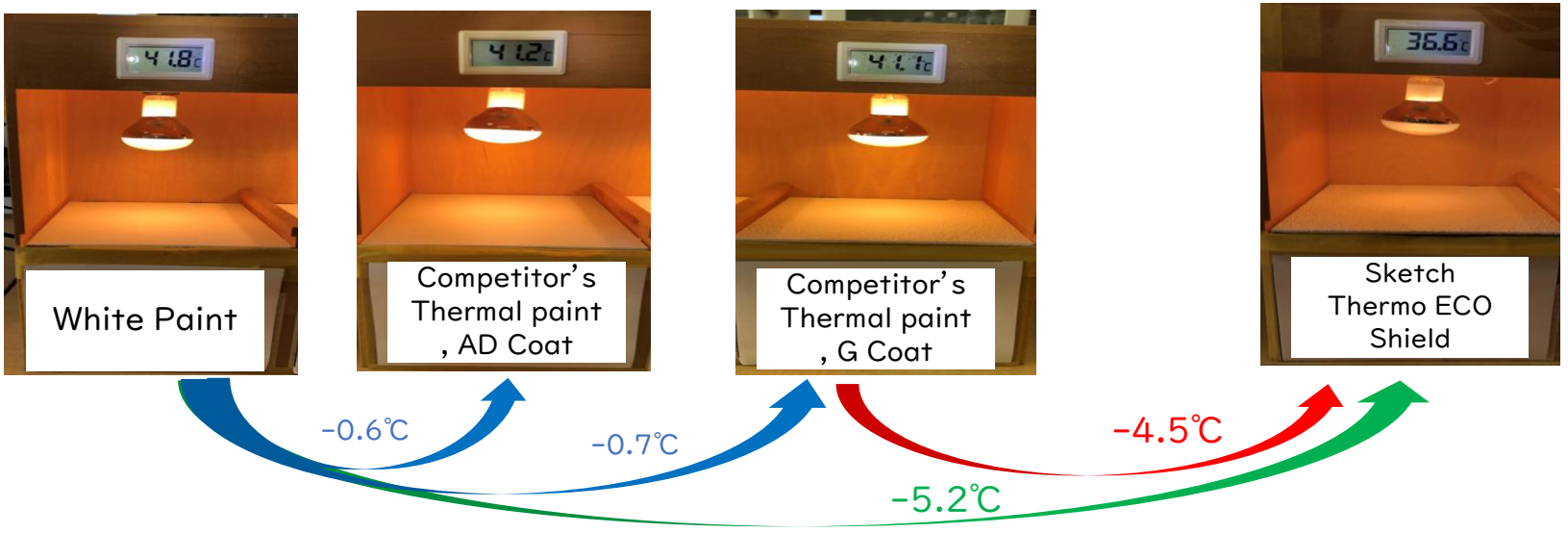
Thermal insulation performance comparison test

Spatial temperature of the sensor installed inside the box

High internal temperature
= low thermal insulation performance

Low internal temperature
= high thermal insulation performance

41.8℃ > 41.2℃ > 41.1℃ > 36.6℃



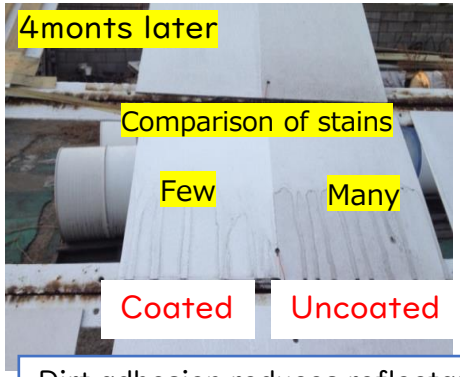
Spatial temperature difference of 5.2°C with white paint,
4.5°C difference with other company's thermal insulation paint

2 reasons why the heat shield and insulation performance is superior to other products

●Reason2：The most important point in maintaining the heat shielding performance is not to reduce the infrared reflectance.

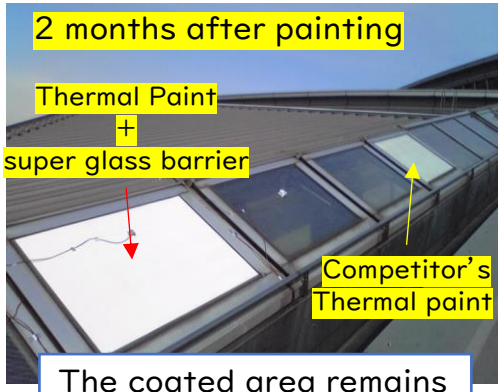
Reflectance is maintained by applying antistatic super hydrophilic antifouling coating "Super Glass Barrier".

Test in Korea



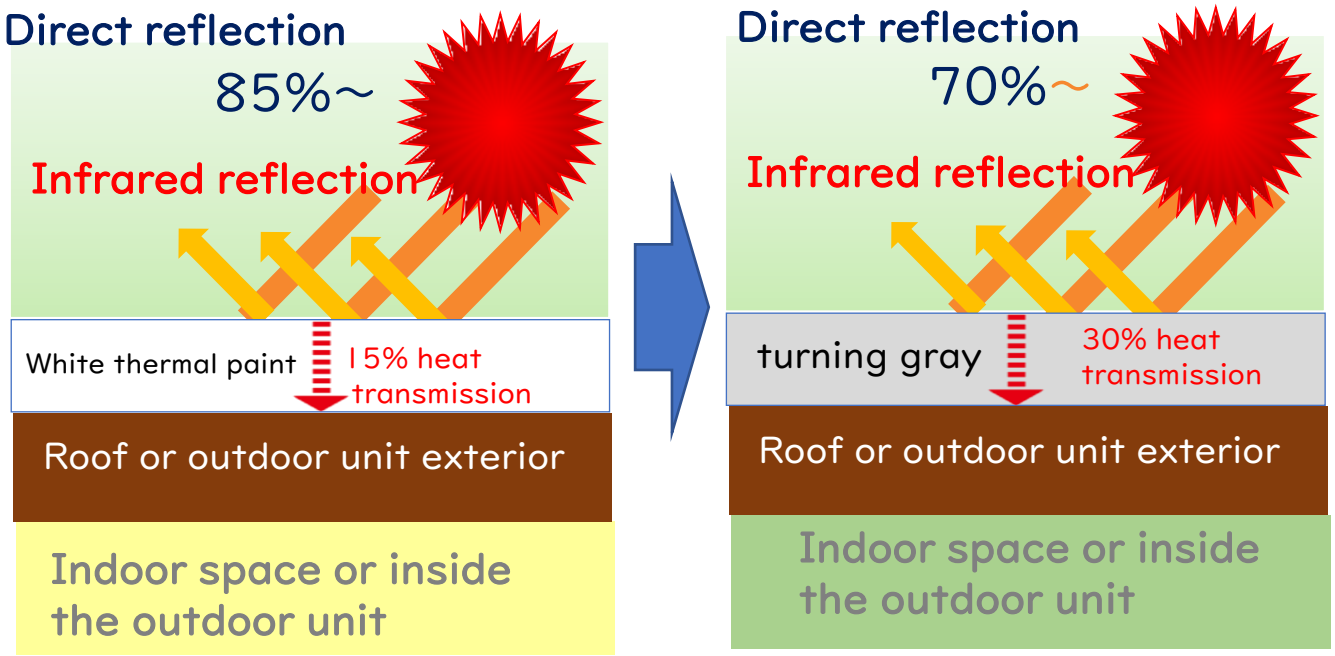
Dirt adhesion reduces reflectance

Tokyo Big Sight West Building



The coated area remains white and clean.

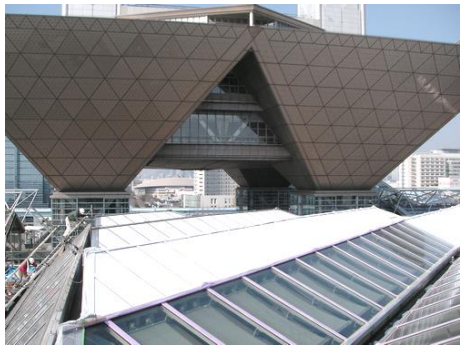
Degradation of white color due to adhesion of dirt



Case Study: Tokyo Big Sight West Hall Roof light Area.

Received Contract for Application of Anti-fouling Coating with Heat-reflective Paint.

Objective: Applying heat-reflective paint to glass surfaces for light-blocking and heat-insulating purposes.
Result: After conducting a test application with another company's heat-reflective paint, our painted surfaces maintained their white color even after 2 months, proving the sustained heat-insulating effect due to the maintenance of infrared reflectance. As a result, our company was chosen, and **we carried out a 2000㎡ application.**



We received an order for a 2000㎡ application.

Thermal paint of other companies + **Anti-dust nano coat Super Glass Barrier**

2months later