

# IRUV CUT COAT

-IRUV CUT COAT Energy Saving  
Performance Measurement-



# 1 : Purpose

- The purpose of energy-saving performance measurement
  - Verify the thermal barrier effect of IRUV cut coat application
  - Quantify the energy-saving effect of IRUV cut coat by measurement.

## 2 : Energy saving calculation method

### ■ Preconditions of trial calculation

#### Condition 1

- When the average room temperature goes down 1°C during the operation time, Energy saving gets to 10% reduction of air conditioner cost.

#### Condition 2

- The energy effect is calculated by electricity fee only (except gas, heavy oil, Heating oil.)

#### Condition 3

- Application room is working by the commercial air conditioning system, even if actual air conditioner is Central air-conditioning system and so on.

## 2 : Energy saving calculation method

### ■ Procedure of trial measurement

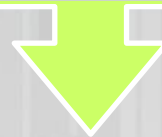
#### **STEP1 : Preparation**

**The selected two rooms to be measured, to collect the necessary data**



#### **STEP2 : Room temperature measurement**

**It measures both coated and uncoated rooms temperature. And also,  
It calculates the difference between the average room temperature of 2 rooms**



#### **STEP3 : To calculate the electricity consumption and the years depreciation**

**Set the energy saving performance to 10% reduction when the temperature difference is 1°C. It calculates Annual electricity consumption reduction compared between coated room and uncoated room.**

# 2 : Energy saving calculation method

STEP1

STEP2

STEP3

## 【STEP1】 Two rooms to be measured

《Selection condition》 ❌ Prepare the rooms have same condition as much as possible !

- ① Same floor area
- ② Same direction of Window
- ③ Same number and the size of window
- ④ Nobody use measuring rooms

⇒ We recommend to measure during holidays and day off .

### ※Notes

- In the case of the measurement room is wide space (atrium, etc.) or large floor area, there might be no temperature difference between coated and uncoated room. Because the room temperature is often changed.
- Please select Small and medium-sized room (such as a conference room) that is as much as possible hermetically sealed as measure room.
- It might be difficult to see the effect by the measurement time.

**STEP1 :**  
Preparation

We select 2 rooms as measure target, and collect Necessary data.

## 2 : Energy saving calculation method

**STEP1**

**STEP2**

**STEP3**

**【STEP1】** Collect necessary information before calculating

- ① Mean temperature difference; It measures room temperature of coated and uncoated
- ② Power consumption of air conditioning
- ③ Operation time / day off/ holiday of Air conditioning
- ④ Operation period for a year

**STEP1 :**  
**Advance preparation**

**We select 2 rooms as measure target, and collect Necessary data.**

## 2 : Energy saving calculation method

STEP1

STEP2

STEP3

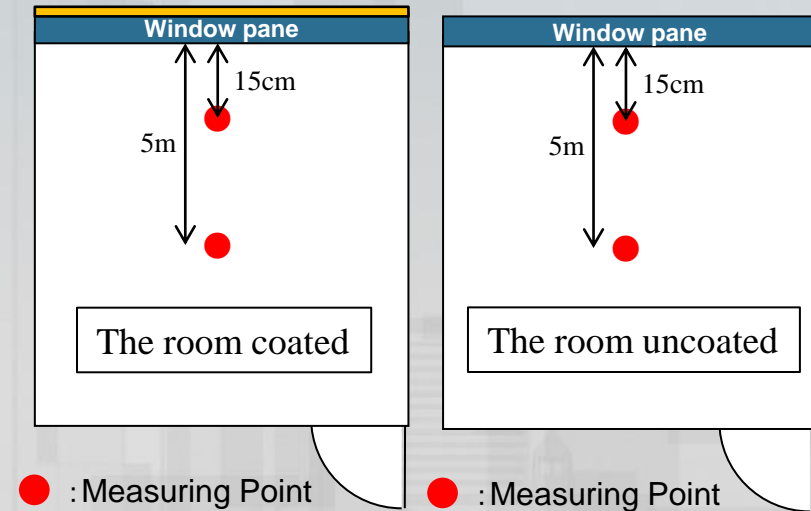
### 【STEP2】 Method of measuring the room temperature

It measures 2 rooms temperature of Coated and Uncoated more than 1 week.

2 rooms are the same area of windowpane , floor , direction.

#### 《Notes while the measuring period》

- ① 2 measuring points; The distance is 15cm and 5m from the window pane at each room
- ② Measuring interval; 10-30 minute intervals
- ③ Turn off air conditioner while measuring
- ④ Keep open the curtain or the window shade
- ⑤ Don't open the windowpane



**STEP2:**  
Measuring room temperature

It measures 2 rooms temperature and calculates the difference of mean 2 rooms temperature.

# 2 : Energy saving calculation method

STEP1

STEP2

STEP3

## Measuring room temperature device for example

Product '**Thermo cron SL**' is made from KN Laboratories company in Japan

[http://www.kn-labs.com/thermochron\\_sl.htm](http://www.kn-labs.com/thermochron_sl.htm)

**Mounting**

**Setting of temperature measurement before measuring**

**Measuring room temperature**

**1 week later**

**Verifying measurement of results and the mean room temperature difference**

Recording date and time	Coated Temperature(°C)	Uncoated Temperature(°C)	Temperature difference Temperature(°C)	Outside temperature Temperature(°C)	Weather
2013/10/01 11:00:01	30.5	32.0	1.5	26.6	Clear
2013/10/01 12:00:01	38.0	43.5	4.5	27.5	
2013/10/01 13:00:01	37.5	46.0	8.5	27.9	
2013/10/01 14:00:01	35.0	51.5	16.5	29	
2013/10/01 15:00:01	43.5	53.0	9.5	29.9	
2013/10/01 16:00:01	32.5	38.0	5.5	28.5	
2013/10/01 17:00:01	34.5	35.0	0.5	27.3	
2013/10/01 18:00:01	28.5	29.5	1.0	25.7	

Maximum temperature difference :16.5 degrees

**STEP2:**  
Measuring room temperature

It measures 2 rooms temperature and calculates the difference of mean 2 rooms temperature.



# 2 : Energy saving calculation method

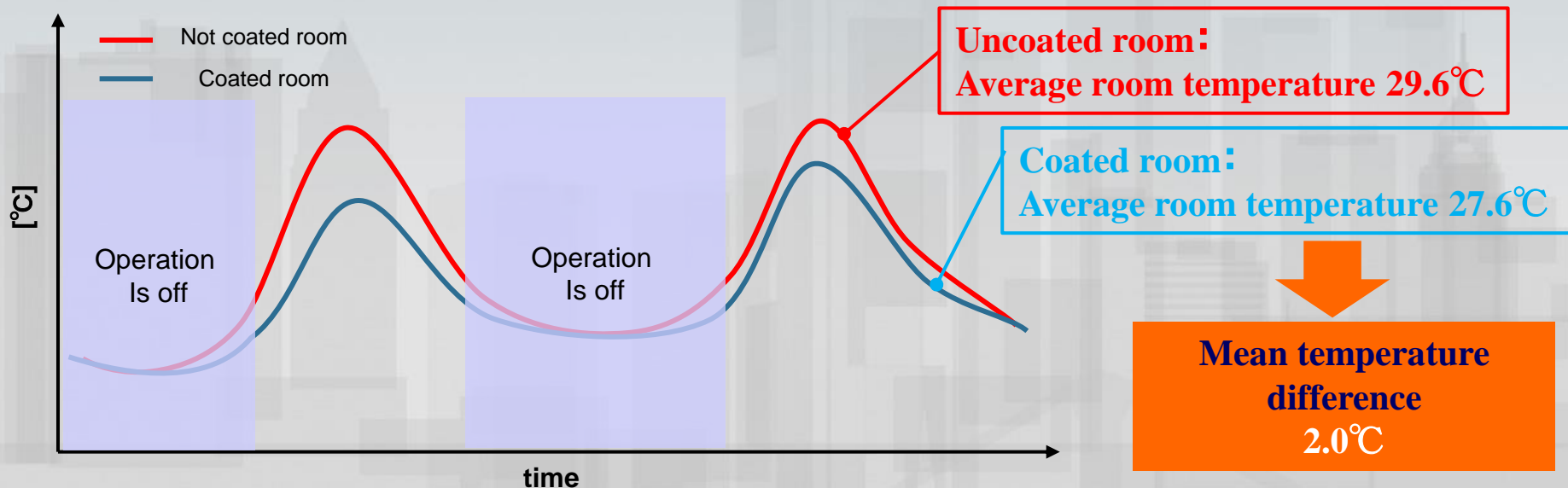
STEP1

STEP2

STEP3

## 【STEP2】 Calculating the mean room temperature difference

- It calculates an average value of the room temperature during the operating time.
- It calculates the mean room temperature difference between coated room and uncoated room



**STEP2:**  
Measuring room temperature

It measures 2 rooms temperature and calculates the difference of mean 2 rooms temperature.

## 2 : Energy saving calculation method

STEP1

STEP2

STEP3

### 【STEP3】 Calculating electric consumption amount

- Calculating the power consumption of air-conditioning after application

- Simulation : The mean temperature difference is 2°C. Power consumption of air conditioning is 18kW

After application , the power consumption of air-conditioning is below

$$18\text{kW} - (18\text{kW} \times 0.2) = \underline{14.4\text{kW}}$$

- Calculating the reduction amount of electricity consumption

- Simulation : Operation time of air-conditioning per a day : 10hours , a year : 365days

power consumption before application[kWh] =  $(18\text{kW} \times 10\text{hours} \times 365\text{days}) = \underline{65,700\text{Wh}}$

power consumption after application[kWh] =  $(14.4\text{kW} \times 10\text{hours} \times 365\text{days}) = \underline{52,560\text{Wh}}$

Power consumption reduction =  $\underline{65,700\text{Wh}} - \underline{52,560\text{Wh}} = \underline{13,140\text{Wh}}$

- Calculating the energy saving cost and the payback period

- Simulation : Electricity rates is 15Yen/kwh, Application area is 200sqm, Application cost is  $200\text{sqm} \times 2,500\text{Yen} = 500,000\text{Yen}$

Reduce cost for a year =  $\underline{13,140\text{Wh}} \times 15\text{Yen} = \underline{197,100\text{Yen}}$

**Payback period =  $500,000\text{Yen} \div 197,100\text{Yen} = \underline{\text{within 2.6 years}}$**

**STEP3: The calculated power consumption**

Assumption is that 「the mean temperature difference of 1°C ⇒ energy saving of 10%」  
We calculated the annual power consumption reduction

# 2 : Energy saving calculation method

STEP1

STEP2

STEP3

## Using Calculating formula at excel sheet

Calculating formula of energy saving for IRUV Cut Coat

Please write only inside  space  
 is automatically calculated

① What is the Mean temperature difference between coated room and uncoated room?

°C     % Energy saving of air conditioning

② What is the Power consumption of air conditioning ?

kwh

③ After application , the power consumption of air-conditioning is below

kwh    -     =     kwh

④ How many time is your Operation time of air-conditioning ?

hours     days for a year

⑤ Power consumption reduction for a year

Wh

⑥ What is the electricity rate ?

Yen/kwh

⑦ How many field did you apply ?

m<sup>2</sup>

⑧ How much is the application cost ?

×  Yen/m<sup>2</sup> =  Yen

⑨ Did you pay other cost for application? How much is it?

Yen    ⇒    Total cost is  Yen

⑩ Reduction cost for a year

Yen

⑪ Amortization period

years

**STEP3: The calculated power consumption**

Assumption is that 「the mean temperature difference of 1°C ⇒ energy saving of 10%」  
We calculated the annual power consumption reduction