For Heat Cut in the summer / For prevent to escape Heat in the winter
Energy Saving measures for Window glass

IRUV Cut Coat Hyper-SP Product Description
A step towards global warming countermeasures

At the Brazilian Rio Summit (Earth Summit) in 1992, the international climate change initiative started with the adoption of the United Nations Framework Convention on Climate Change, was adopted in 1997 by the adoption of the Kyoto Protocol, I took a big step. And, as Russia ratified the Kyoto Protocol in the autumn of 2004, the Kyoto Protocol came into effect (to be effective) in February 2005, which enabled the Energy Conservation Reform Act to be enforced in Japan in April 2009, Energy conservation consciousness for buildings has become increasing, such as energy conservation measures are obliged for expansion and renovation with floor area of 300 m² or more and fine punishment is imposed from recommendation.

The "Paris Agreement" was established at COP 21 and it was a historical agreement for international climate change countermeasures.

COP 21 (Participating Country 196) of the United Nations Framework Convention on Climate Change concluded by delegates from each country held in Paris, France from 20th November 2015 will be held on December 12, 2020 local time We have officially adopted the international framework for global warming countermeasures "Paris Agreement". Like the Kyoto Protocol, this Paris Agreement was agreed as a strong agreement with legally binding power. Towards "to keep the world's average temperature rise to less than 2 degrees" as the overall goal, in the second half of the century worldwide, the direction to substantially reduce greenhouse gas emissions from human activities to zero It launched. For that purpose, all countries were obliged to make emission reduction targets and submit it, and it was also obliged to take domestic measures to achieve them. This Paris Agreement means that the convention to decide the future direction of the world economy has been decided by a legally binding international agreement. We decided to aim for a low carbon society and a decarbonized society all over the world. In other words, from now on politics, business and local governments all mean that "carbon emissions are not good". Since the Paris Agreement also obliges to promote emission reduction through domestic measures, we will have the opportunity to win domestic measures just in response to the Paris Agreement.

In this way, global warming is a serious problem that immediate measures and improvement on a global scale are urgent. Based on this world situation, In order to promote global warming countermeasures, at Sketch Co., Ltd., with the aim of "Energy Saving Decarbonization Society Starting with a Window - Prevention of Global Warming" as a flag, the window glass (90% of domestic existing buildings), which is not an energy saving specification, We propose thermal insulation renovation of window glass with agents.
The window glass with the most heat transfer

It is not an exaggeration to say that summer heat and coldness in winter depend on the window. The influence of exterior walls and roofs that are in contact with the outside air is surprisingly small, and most of the heat comes in and out of the windows.

72% of the solar heat comes into the room from the window in the summer, and 48% of the heating heat escapes from the window in the winter, assuming the whole building as 100%. In other words, in building of energy saving measures, heat shielding against window glass is the most effective.
The biggest point is to reduce the work of air conditioning

It is well-known that the proportion of air-conditioning equipment occupied in power consumption is large. How to efficiently use air conditioning equipment that accounts for this large proportion will be the most important point of energy conservation.

So, where and how can we improve it? For that, we must pay attention to windows where heat come in and out the most.

"Air conditioning cost reduction measures" from 10 am to 4pm in the daytime is top priority

The Point is Peak hour cut of the Air-Conditioning at 10AM～16 PM

The Information From Agency for Japanese Natural Resources and Energy on May,2011

Demand for electric power at hourly intervals

The Information From Agency for Natural Resources and Energy

In the case of office building

Demand Structure of 2PM at office building

Air-conditioning 42%
Lighting 27%
The others 14%
Show Case, refrigerator 6%
Elevator, Escalator 3%
Office Automation 8%
Hot water heater 0.1%

Assuming temperature conditions at 14:00 on July 23, recording the peak peak demand (59.99 million kW) in 2010

In the case of households

Average of all households in general households, power consumption ratio by usage

Air Conditioning 58%
Others 14%
Refuge 17%
Lighting 6%
TV 5%

Source: Estimate from Agency for Natural Resources and Energy
Method of low carbon society

From the entry into force of the Kyoto Protocol to the present, various energy-saving technologies have been developed, commercialized and put into practical use in the construction and construction fields. Among them, it has been clarified that window glass measures are the most advantageous in terms of the relationship between the introduction cost and the CO2 reduction effect.

The Comparison report for the amount of CO2 reduction to be the energy-saving measures of the building in case of budget of ¥100 millions.

<table>
<thead>
<tr>
<th>Method</th>
<th>Cost ¥100billion</th>
<th>The CO2 Reduction effect [t-CO2]</th>
<th>The CO2 reduction effect per ¥100million [t-CO2/100million]</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Thermal material</td>
<td>5920</td>
<td>-22771</td>
<td>-3.85</td>
</tr>
<tr>
<td>High Reflective Paint</td>
<td>3222</td>
<td>7007</td>
<td>2.17</td>
</tr>
<tr>
<td><strong>Heat Insulation Film</strong></td>
<td>2477</td>
<td>117270</td>
<td><strong>47.35</strong></td>
</tr>
<tr>
<td>Gardening Rooftop</td>
<td>7900</td>
<td>3756</td>
<td>0.48</td>
</tr>
<tr>
<td>Earth thermal heat pump</td>
<td>10764</td>
<td>46208</td>
<td>4.29</td>
</tr>
<tr>
<td>Ground tree planting</td>
<td>6100</td>
<td>10124</td>
<td>1.66</td>
</tr>
<tr>
<td>Water-retentive pavement</td>
<td>5424</td>
<td>7791</td>
<td>1.44</td>
</tr>
</tbody>
</table>

VS

Glass Film

Glass Coating
Window energy-saving products

The following are typical products related to energy-saving renovation. Options vary depending on the customer’s form (building, condominium, commercial facility, private house, etc.).

(1) To exchange Low-E Double glazing glass is mainly for service facility, but there is almost no renovation unless the glass is broken.
(2) Interior window sash is only for condo, house
(3) Window film
(4) Window glass coating corresponds to any building, but a High-performance type is expensive cost for renovation.

Heat insulated renovation of window glass for energy saving in Japan.

<table>
<thead>
<tr>
<th>Type</th>
<th>Application cost</th>
<th>Type</th>
<th>Application cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Low-E Double Glazing Glass</td>
<td>¥40,000/㎡~</td>
<td>(2) Interior window sash Low-E</td>
<td>¥25,000/㎡~</td>
</tr>
<tr>
<td>(3) High heat insulating Window film</td>
<td>¥15,000/㎡~</td>
<td>(4) Other glass coating</td>
<td>¥15,000/㎡~</td>
</tr>
<tr>
<td>IRUV Cut Coat H-SP</td>
<td></td>
<td></td>
<td>¥12,000/㎡</td>
</tr>
</tbody>
</table>
Heat shield, heat insulation, UV cut to control the heat transfer of windows

IRUV cut coat can be applied with a roller, as a heat shield in summer, UV protection, and heat escape from heating heat in winter. In addition, it is very economical because it is more than twice as durable as a thermal barrier film. It is an energy-saving product that does not require large-scale application.

Renovation of the window
Shields sunlight and ultraviolet rays in summer and suppresses direct heat from the window by about 8-15 °C. In addition, the warmth that feels comfortable in winter and the outflow of heating energy are suppressed, and the indoor warming effect is enhanced.
• Near Infrared rays cut is 80% or more.
• UV Cut is more than 99%

How it works
When direct solar heat hits 100% window glass, reflection is 5%. The amount absorbed by the window glass is 55%. 36.7%, which corresponds to 2/3 of the 55% absorbed, re-radiates to the incident side of sunlight, and 18.4%, which corresponds to the remaining 1/3, re-radiates to the indoor side. The total cut of reflection 5% and absorption re-radiation 36.7% is 41.7%.

<table>
<thead>
<tr>
<th>Test pieces</th>
<th>Coating glass thickness 3mm</th>
<th>Normal glass 3mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal conductivity</td>
<td>4.6kcal /㎡h℃ (5.3W /㎡ K)</td>
<td>5.1kcal /㎡h℃ (6.0W /㎡ K)</td>
</tr>
</tbody>
</table>
The performance of IRUV Cut Coat **Hyper-SP**

### Energy Saving
Reduces air-conditioning load by heat insulation effects

### Heat Insulation
For Air-Conditioning in Summer

### Heat escape prevention
For Heater In Winter

### UV Cut
Harmful UV rays 99% cut or more

### Condensation
50% or more of suppression

### Durability
10 years Or more

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**Heat insulation by IR Cut in Summer**
- Heat cut about 8~15°C through window glass
- Shielding near-infrared rays of heat that feel uncomfortable
- Reduces indoor temperature rise and improves air conditioning efficiency

**In Summer**
- Solar heat enters, cooling is not effective, and the room is hot
- Reducing solar heat and lowers room temperature by 2-3 °C
  The cooling effect is improved.

**In Winter**
- Heating heat escapes from the window
  The room is cold with poor heating
- Reduces heat escape from heating heat
  Heating effect is improved

**Winter of insulation far-infrared cut**
- Don't let the heating heat escape from the window
  Light of warmth that feels comfortable "far infrared"
  Suppresses the flow of heating heat energy
Comparison of the heat insulating film
「Pasting」film 「Coating」IRUV Cut Coat

**Glass Film**

- **Film**-
  Due to the deterioration of glue, peeling or bubbles may occur in about 5 to 7 years.
  - IRUV Cut Coat **H-SP-15 years durability**

- **Heat Crack**
  The thickness is as thick as 80 microns, and it can not handle the expansion and contraction of glass, so it is easy to break.
  - IRUV Cut Coat **H-SP**

**Glass Coating**

- **Film**-
  Because the standard dimensions are fixed, the joint line between the films remains in a large window glass.
  - IRUV Cut Coat **H-SP**
  Even large glass is seamless and finished as one surface.

- **Joint line**
- **Scratch**
  Since the surface hardness (pencil hardness) is H-2H, it is easily damaged.
  - IRUV Cut Coat **H-SP**
  Pencil hardness is 4H and is hard to be scratched (After complete curing)
Comparison with other coatings

(1) Workability

【Other Coatings】

☆Difficult application
☆Cannot be fixed.
☆Hard to peel off
☆Hard to coat for big size (Sponge bar)

【IRUV Cut Coat H-SP】

☆Easy application
☆can be fixed
☆Easy to peel off
☆can apply for big size
☆No dripping, unevenness
☆Uniform film thickness
☆Easy to master application technique

☆Easy to occur dripping and unevenness
☆Unable to adjust film thickness
☆It takes time to master Application technique
Data collection / test booth

Korean Construction Company measured the temperature at 4 rooms under the same conditions. As a result, the room temperature was at most 3.6 °C lower than the non-coated room. Air conditioning cost reduction rate of the year was 14% (28%). (※As a condition, the temperature setting of air conditioning change 1 °C effects 5% of the energy-saving. Calculated at 10% in Japan) Calculate the application cost by electricity charges and labor costs in South Korea, it has proved to be recovered in 4.9 years. South Korea’s is the cheapest electricity rates in the developed countries, it will be recovered within five years even there is winter time.

- The indoor temperature comparison by the changes in the outside air temperature-
The examples of Heat insulating performance in Summer

Temperature measurement at application site/ Amusement facility/Smoking room in Oita-ken Japan

Summer is hot and no one wants to enter the smoking room. Even if the air conditioner is set to 19 °C every year, it becomes hot air. Although a film was pasted, it was installed 10 years before and no effect. After application of IRUV Cut Coat, temperature measurement was performed.

~Customer comments after application~
Until now, even if the air conditioner setting was 19 °C, it was too hot to enter the room. However, after application, even if the air conditioner setting was raised to 24 °C, it became cool, and I felt a strong heat shielding effect.

* The air conditioning load is reduced by 5 °C (energy saving about 30-50%) because it is comfortable even at the air conditioning set temperature of 19 °C ➔ 24 °C.
Golf Course / Clubhouse in Singapore

Active in hot Southeast Asia

Result of the temperature measurement, the temperature difference of the direct heat at the window was 8 ℃ (maximum) in comparison with the uncoated glass (Low-E glass) Reduction rate of the air conditioning costs was 20 percent, so recovery of the initial investment simulated in 2.03 years. Because there was high electricity prices and low applicator cost. For 10 years coating guarantees, we can expect significant cost savings of 20% to 30% more than eight years is. ⇒ 2 years payback period and more than eight years profit.
Energy Saving Performance in Winter

Heating heat energy

Heat escape prevention test in Canada

Glass box with a heat source (light bulb) and thermometer. As a result of measuring the transition of the temperature inside the BOX, Uncoated box and coated box installed outdoors, The temperature inside the coated BOX (40W) is the highest and suppresses heat escape compared to the uncoated BOX (50W, 60W). The coating warms the room with a small amount of heat, improving heating efficiency and showing a high energy-saving effect.

Exam contents:
Prepare three 30cm square glass boxes and install it outdoors with a light bulb inside. Measure internal and external temperatures. One glass BOX is covered with a glass coat and 40W bulbs are used. The remaining two glass boxes were left uncoated, and 50W and 60W bulbs were installed.

- Period: 9 am~1pm on Nov 21th, 2013
- Test location: Vancouver, Canada
- Outside temperature: 4 °C ~ 5 °C, cloudy weather
Energy Saving for School

As a result of application at an elementary school in Vancouver, Canada and comparison with the air conditioning costs from 2009 to 2011, an average 16% reduction in air conditioning costs were demonstrated. Converting 16% into monetary amounts will reduce air conditioning costs by 5,472 Canadian dollars (approximately 474,200 yen) annually, so application costs can be amortized and recovered within 1.97 = 2 years. (8 years will be profitable due to durability over 10 years)
50% suppression of Dew Condensation in Winter

Condensation means that in the winter, moisture-containing air is cooled on the window glass and becomes water droplets. When coated, the glass surface absorbs heat, warming the glass surface and slowing down condensation. In addition, since the water retention of the coating surface itself is high, the time it takes for the water to drip is as follows: uncoated glass = 30 minutes, coated glass = 104 minutes.

<table>
<thead>
<tr>
<th>Test category</th>
<th>Time to start dripping</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Uncoated glass</td>
<td>30 minutes later</td>
</tr>
<tr>
<td>(2) Coated glass</td>
<td>104 minutes later</td>
</tr>
</tbody>
</table>

Difference in condensation state between coated and uncoated
TV, newspaper, magazine, etc.

No. 1 in the thermal barrier glass coating industry (70% market share).
It was also introduced on TV and industry newspapers.
IRUV Cut Coat H-SP of trust and results chosen by many customers

Sample application records

【Amazon Odawara warehouse】
【HOTEL in Hokkaidou】
【KEWPIE Mayonnaise headquarters】
【Kawasaki Heavy Industries Technical Development Division】
【Tokyu hospital】
【Kagoshima District Legal Affairs Bureau Kirishima Branch】
Application Record in Japan(2)

IRUV Cut Coat H-SP of trust and results chosen by many customers

Sample application records

【Ministry of Internal Affairs and Communications】
【Hotel Japan Shimoda】
【Sapporo Beer Chiba Factory】
【Tokyo Gakukan Niigata High School】
【Edogawa City Hall】
【Japan Atomic Energy Agency】
Recommendation for the person like these

[Image: 10% energy saving by the difference of temperature setting of 1 °C]

- **ECO**
  - Considering energy-saving measures
    - Requirement for power-saving heating and cooling.
    - In the summer, to save the air Conditioning fee.
    - In the winter, to keep warm Without the air conditioning.

- **Afternoon sun is hot**
  - I can not stand near a window is hot.
  - Air conditioning does not work in the afternoon sun.
  - Can not sleep in the summer.
  - Can not concentrate on work because of the heat.
  - Care about heat stroke
  - Cooling bill is high.

- **For keeping the heat from inside the room.**
  - Window area is cold.
  - Effectiveness of heating is low.
  - Heating bill is high.
  - Can not sleep because of cold.
  - Avoid to get the cold.

- **The terrible condensation of window**
  - A terrible condensation of the window.
  - The trouble with water dew.
  - I have to wipe the window every morning.
  - Unsanitary mold grows
  - Child asthma.

- **Care about freckles and spots because of UV.**
  - Furniture and sofa have faded.
  - In the summer, Insects gathered to window.
  - Avoid to get the dark spots by UV.

- **Price is Less than half of other insulated glass product**
  - Save the money, a good product Been looking for!
  - Reduce the heat and strong sun light from the window.
  - Demand for the highest performance.