

## The World's First Brush-On Thermal Glass Coating

### Comparison of Insulating Products for Windows

Sketch Co., Ltd.

#### Development History

More than ten years ago, an affiliate of NTT, the major Japanese telephone company, was barraged by complaints about how hot the glass-sided public telephone booths became in the glare of the summer sun. NTT-AT requested Sumitomo Metals and one of Sketch's current officers to come up with a solution and they developed the world's first room-temperature cured thermal insulating glass coating solution.

Sumitomo Metals patented the earliest thermal insulating glass coating which was based on ruthenium and was weak transparent green in color. Developed to deal with the heat of summer, this coating primarily blocked near infrared radiation, but had little effect on far infrared. Because this weak green coat easily generates coating imperfections, application was limited to trained professionals. Moreover, as a result of the franchise and training fees extracted by the NTT-AT group, the installed price of the product for a single square meter ranged from JPY 12,000~15,000. At this high price, the market for the product did not expand rapidly.

In November, 1999, Sketch was successful in developing a thermal insulating coat based upon ATO (antimony tin oxide) that is effective in both winter and summer because it blocks near and far infrared. Anyone can easily apply this new coating without visible imperfections at a cost of only JPY 6,000 per square meter.

As a result of the Kyoto Agreement reached on February 16, 2005, construction companies throughout the world are beginning to deal with improving the energy efficiency of windows as a means of reducing greenhouse gases like CO<sub>2</sub>. In response, Delphi Labs and Sketch introduced IRUV Cut Coat using ATO developed by Mitsubishi Materials which exhibits better thermal performance than films at various trade shows in the US and China, including GlassBuild 2005 and 2006. Sales, concentrated in China and Southeast Asia, are growing.

Three major categories of thermal insulating window products are available today:

1. Glass window products
  2. Film products
  3. Liquid coating products
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1. Glass window products
    - a. Double-paned glass
    - b. Reflective or tinted glass

- c. Heat absorbing glass
- d. Heat absorbing double-paned glass
- e. Low-e double-paned glass
- 2. Film products
  - a. Reflective film
  - b. Transparent insulating film
  - c. Tinted film
- 3. Liquid coating products
  - a. Sketch group insulating coat
  - b. NTT-AT group insulating coat

Technical Data for Sketch's Thermal Insulating Liquid Coating

	Standard 3mm float glass	Treated with Sketch Coat
1. Visible Light Transmittance	90%	69.3~80%
2. UV Block Percentage	34%	99%
3. SC or Shading Coefficient	1	0.72~0.80

Characteristics of Sketch's Thermal Insulating Liquid Coating

1. High degree of transparency. Easy to apply without visible gaps or imperfections. One person can apply about 20~25 square meters per day.
2. 99% of UV radiation is blocked (by UV block version)
3. 1 L can cover 40~50 square meters of window or more.
4. Effective in keeping out summer heat (by blocking far infrared), but also effective in keeping in winter warmth.
5. Cost advantageous given installed price of JPY 6,000 per square meter and product cost as low as JPY 1,000 per square meter.
6. Unlike window films, Sketch's coating has no seams.
7. Expensive window replacements can be avoided because liquid coating can be applied to existing windows.
8. The product lasts ten or more years giving it an edge on window films.
9. Applying IRUV Cut Coat to double paned normal float glass produces windows equivalent in thermal performance to low-e double paned glass.

Comparison of Liquid Insulating Coatings

	NTT-AT's AT Shield Clear on 5mm float glass	3mm float glass with Sketch Coat	
1. Visible Light Transmittance	69%	79.6%	69.3%
2. UV Block Percentage	99%	99%	99%
3. SC or Shading Coefficient	0.78	0.79	0.72

#### Drawbacks of NTT-AT's AT Shield

1. Because of the light green color, imperfections from the application process are readily apparent. In contrast, Sketch's product is nearly transparent.
2. Nearly twice as expensive as Sketch's product in the range of JPY 12,000~15,000.
3. 1 L only covers 20 square meters. In contrast, Sketch's product covers 50 square meters per liter.
4. Because near infra red is blocked, the insulating effect in winter is low.
5. Because far infrared is hardly blocked at all, substantial amounts of heat is allowed to escape during the winter months.

#### Comparison with Energy Efficient Windows (using Asahi Glass window products)

Double paned glass 8mm-6(12)mm-8mm

Heat reflecting glass Sun Cut Sigma Clear 6mm

Heat absorbing glass Sun Blue 5mm

Heat absorbing glass Sun Blue Double Paned 3mm-6(12)mm-3mm

Low E Double Paned San Balance Clear 6mm-6(12)mm-6mm

3mm float glass treated with Sketch's liquid coating

3mm float glass treated with Sketch's liquid coating

#### Drawbacks of Low-E Glass

1. Low percentage of UV blocked (refer to UV percentages in chart)
2. Because the surface will oxidize, cannot be used in a single pane product
3. 20~30% waste from storage and fabrication of double pane glass units from low-e glass
4. Replacement costs are very high for existing glass that is not energy efficient (JPY 30,000~50,000 per square meter)

#### Merits of Low-E Glass

1. Strong thermal properties (refer to SC or shading coefficient in chart)
2. Because the surface will oxidize, cannot be used in a single pane product
3. 20~30% waste from storage and fabrication of double pane glass units from low-e glass
4. Replacement costs are very high for existing glass that is not energy efficient (JPY 30,000~50,000 per square meter)

#### Comparisons with Window Films

Teijin Lefuteru ZC06T attached to 3mm float glass

Sumitomo 34 Scotch Tint WH72CLAR attached to 6mm float glass

Sketch's liquid coating on 3mm float glass

Sketch's liquid coating on 3mm float glass

## Weaknesses of Window Films

1. Longevity of films is limited by the glue used which weakens over time (only lasts half the period of Sketch's liquid coating)
2. Scratches easily because only has a hardness of 1~2H (in contrast with Sketch's liquid coating of 4~5H)
3. Higher cost – often twice the cost of Sketch's liquid coating reaching JPY 12,000~15,000.
4. Cannot apply to patterned glass [or composite glass – moyo no aru glass or awase glass?]
5. Because film comes in rolls with defined widths, films have seams (usually every 1.5M)

## Strengths of Window Films

1. Thermal properties are good (refer to SC or shading coefficient in chart)
2. Also has shatter-resistance properties that liquid coatings do not have

## 遮熱ガラスコート剤データ 製品

	可視光透過率	UV カット率	SC
一般販売 3mm ノーマルフロートガラス	90%	34%	1
当社遮熱コート 3mm フロートガラス塗布	69.3% ~ 80%	99%	0.72 ~ 0.80

## 遮熱ガラスコート剤との比較

### 製品

可視光透過率

UV カット率

SC

NTT-AT アットシールドクリア 5mm フロートガラス塗布

69% 99% 0.78

当社遮熱コート 3mm フロートガラス塗布

	79.6%	99%	0.79
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当社遮熱コート 3mm フロートガラス塗布

	69.3%	99%	0.72
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旭硝子窓ガラス製品との比較  
製品

	可視光透過率	UV カット率	SC
ペアガラス 8mm-6(12)mm-8mm			

	77.8%	58.6%	0.80
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熱線反射ガラス サンカット クリア 6mm

	63.1%	65.2%	0.78
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熱線吸収ガラス サンプルー5mm

	79.4%	60.2%	0.82
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熱線吸収ペアガラス サンプルーペア 3mm-6(12)mm-3mm

	76.4%	58.1%	0.79
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LOW - E ペアガラス サンバランスクリア 6mm-6(12)mm-6mm

	75.4%	74.8%	0.65
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当社遮熱コート 3mm フロートガラス塗布

	79.6%	99%	0.79
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当社遮熱コート 3mm フロートガラス塗布

	69.3%	99%	0.72
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各社透明遮熱フィルム製品との比較

製品

	可視光透過率	UV カット率	SC
帝人 レフテル ZC06T 3mm フロートガラス貼付			

	80%	99%	0.69
住友 3M スコッチティント WH72CLAR 6mm フロートガラス貼付			
	74%	99%	0.70
当社遮熱コート 3mm フロートガラス塗布			
	79.6%	99%	0.79
当社遮熱コート 3mm フロートガラス塗布			
	69.3%	99%	0.72