

Solar Control Window Film



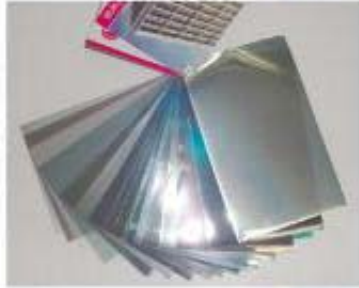
Introduction

Solar heat gain is one of the heat sources in an air conditioned space.

Reducing solar heat gain can save air conditioning energy, especially in summer time. Buildings using modern glazing that



have good solar control capability, such as high reflectance, heavy coating and low shading coefficient etc. can reduce the heat gain. People usually lower indoor Venetian blinds or curtains to mitigate the solar radiance heat. However, it



is less effective in terms of energy saving as the heat is trapped between the glazing and the blind or curtains and will get back to the air-conditioning system eventually. Besides, the visual connection to the outdoor environment is impaired. Solar control window film can effectively reduce solar heat gain without impairing the visual connection. This pamphlet provides information on its application and selection from energy efficiency point of view.

Basic Principle

Solar heat in the form of radiation with wave lengths from $0.78\mu\text{m}$ - $2.5\mu\text{m}$ penetrates through the glazing into indoor. The radiation heats up the indoor space resulting in more air conditioning energy required to remove the heat. It is

estimated that the solar heat gain through glazing can account for 15%-20% of the air conditioning cooling load. Hence, reducing solar heat gain through windows can save energy.



Selecting Solar Control Window Film

Price of solar control window film can vary significantly depending on the quality and nature of the product. There are two main parameters to consider for selection of solar control window film:

(1) Visible Transmittance (TV):

It is the fraction of visible light transmitted through the window.

The higher the TV value, the more transparent the window film appears. For clear glass, typical value of TV is about 0.8 - 0.9.



0 Increasing TV 1

The higher TV, the more transparent the window appears

(2) Shading Coefficient (SC):

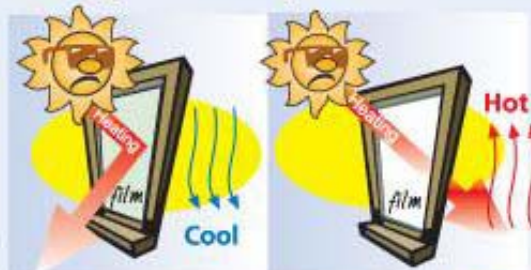
It is the ratio of solar gain through a particular window glass to solar heat gain through a single piece of 3 mm thick clear glass under the same conditions.

The **lower** the shading coefficient, the **better** the

solar control capability. For clear glass, typical value of SC is about 0.9.

To choose a suitable product customer may

take note of the following factors:



0 Increasing SC 1

The lower the SC, the lower solar heat gain

Identifying Occupant Needs:

The occupants should consider whether their main purpose is to reduce solar heat gain or to reduce window glare. Low SC product can reduce heat better and hence save more energy. Low TV product can reduce glare better and also cheaper.



Identifying Other Needs:

There may also be other considerations when choosing a suitable product. For example, some films are tinted or highly reflective; they will change the appearance of the building or create a mirror effect on the window, especially at night. Maintaining good visual connection with the outdoor environment is important in some applications such as display window of retail shop, cafeteria or high rise building that have good outlook. In these applications, window film that has high TV is preferable.



Product Warranty and Manufacturer's Reputation:

Under normal situation, good quality solar control window film can last for 10 years or even longer. Customer should consult the manufacturer for the expected life span of the product and the warranty. Reputable manufacturers usually provide warranty from 5 to 10 years.

Energy Saving Potential

The energy saving of solar control window film is site specific. Computer simulation, which takes into account many factors, such as building orientation, glazing area, existing shading coefficient, type of air conditioning system and operating habits etc., is usually required to estimate the potential energy savings. In general, improving solar control capabilities by means of using lower shading coefficient of windows, say, by reducing SC to half of its original value, can save 4% - 5% of annual air-conditioning electricity consumption under local climate condition. Buildings that have the following characteristics usually can provide better opportunity in achieving energy saving:

- The glass of the windows are not tinted or without reflective coating.
- High window area to external wall area ratio;
- Windows facing south and west and exposed to direct sunlight;

Installation and Maintenance of Solar Control Window Film



The solar control window film is usually installed or applied in the indoor side of the glazing. Some manufacturers require the installation to be done by their teams in order to provide customers with the guarantee. The installation works are simple and can be done even after a building is occupied. The steps include cleaning the glass from oil stains or dirt; removing the liner from the window film; spraying water on the adhesive of the film; putting it on the window glass; and removing the wrinkles and bubbles. The final step is to wait for a few hours to let the adhesive settle.

Under the following situations, it is recommended to consult manufacturers on the suitability of window film applications as installation of solar control window film may increase the heat stress to the window glass, and in the extreme situation may result in cracking of glass:

- Glazing with a single piece of large area (e.g. 10 m²) glass and have high solar exposure;
- Thick glasses (e.g. over 10 mm clear glass) and have high solar exposure; or
- Composite glasses such as reflective, laminated, wired, patterned, or texture glass;

Cleaning of Solar Control Window Film

The surface of the film can be cleaned by soap and water. However, alcohol base or abrasive cleaning agents should be avoided as they will damage the film material. Additionally, the film surface will be damaged if scratched by sharp objects.

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