



Environmentally Sustainable Solar Shading in Facade Glazing



A Window to the Future

MicroShade™ - for Environmentally Friendly Facade Glazing

Freedom in Design

As standard, MicroShade™ comes in 140 mm wide strips for horizontal installation in the glazing pane, but specialised versions designed for vertical fitting can also be supplied.

In this way, the MicroShade™ strip can be positioned as desired in the glazing pane. The strongest effect is achieved by completely covering the glazing pane, but MicroShade™ offers full flexibility and can be limited to one or more smaller areas in the same glazing unit if needed.

Work-friendly Light

Screening of solar irradiation plays an important role in sustainable and environmentally adapted buildings. This applies to both renovated and new buildings. Sunlight should be allowed into the building according to the season in order to achieve the best light conditions and the most comfortable temperature indoors.

MicroShade™ solar shading is the new generation of modern, environmentally optimised facade glazing solutions for future buildings – without unnecessary waste of energy and environmental impact from cooling and ventilation. Glazing panes with MicroShade™ have integrated micro-lamellas that permit temperature-regulating, energy-saving and work-friendly light intake throughout the day.

Intelligent Technology

MicroShade™ is a special transparent layer that can be integrated between the panes of glass in most double or triple glazing panes. The layer contains a patented micro-lamella structure. The structure consists of a large number of small perforations which are angled in such a way that they shade direct sunlight while permitting a full view through the shaded pane.

The MicroShade™ technology is intelligent shading constructed on the principles of nature. By significantly reducing excessive heating of the building by the sun, the powerful sun-shading glazing panes create a temperate and pleasant indoor climate throughout the year. MicroShade™ does not need to be operated, serviced or maintained.

Effective. Shades just as effectively as exterior solar shading solutions.

Economical. Easy to install. No maintenance or repair costs. Easy to clean.

Robust. Resistant to weather conditions, high temperatures and the effects of wind and sunlight. No moving parts.

Discreet. Gives an unrestricted view from inside. Forms an integrated and aesthetic element in the facade of the building.

Neutral. Reduces only the intensity of sunlight. Does not affect the colour of the light – only natural daylight.

Flexible. Available for all standard pane types, for example with internal security glass, tempered or laminated glass.



New Standards

MicroShade™ sets new standards for the relationship between solar shading, light transmission and aesthetics. Compared with external shading solutions, MicroShade™ is a simple, effective and flexible solution suitable for most facades.

Clean and Simple Technology

MicroShade™ can do a little more than conventional solar shading. The simple and well thought-through solar shading in MicroShade™ has been developed to have the most powerful shading effect when it is most needed – in the middle of the day and in the summer.

With its innovative design, MicroShade™ provides a comfortable and temperate indoor climate, which reduces the use of air-conditioning and may even make it entirely unnecessary during hot summers. During wintertime, the solar shading in MicroShade™ allows more sunlight to pass through so that the solar energy actively comes into play and contributes to heating the building when required.

Free Choice of Pane Type

MicroShade™ can be used with standard double or triple glazing with a choice of types of glass as required. MicroShade™ is fitted when the glazing pane is manufactured and the finished glazing pane is supplied and fitted like a standard glazing pane.

Glazing panes with MicroShade™ retain their full insulating properties.

Guideline Optical Values and Thermal Ratings

The shading principle in MicroShade™ has been designed according to the sun's pattern of movement during the day and year – the higher the sun, the better the shading effect.

The shading effect can be expressed as the g-value of the glazing pane. The lower the g-value, the stronger the shading effect. A standard low-energy glazing pane has a g-value of 0.76, while special sun-reducing panes can have values as low as 0.24.

In comparison, the MicroShade™ g-value can be as low as 0.10, corresponding to maximum shading.

A significant benefit of MicroShade™ is that direct solar irradiation is heavily reduced or, in some cases, completely blocked. Compared to, for example, coated sun-reducing glass or solar film, this noticeably increases comfort near the facade.

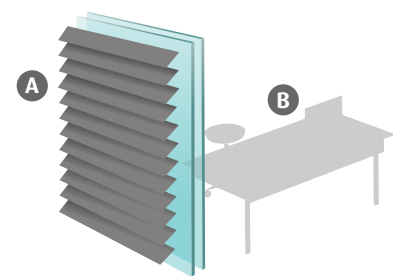
With MicroShade™ a more even temperature distribution can be achieved throughout the room and extra cooling of areas near the windows can be avoided.

Guideline values/ratings	MicroShade™ type MS-A	Sun-reducing glass 3)
U-value rating (W/m²K)	1.1 / 1.1 1)	1.0 / 1.1 4)
Light transmittance 2)	0.49	0.66
g-value (summer, average)	0.12	0.32
g-value (autumn, average)	0.27	0.36
g-value (winter, average)	0.33	0.37
g-value (spring, average)	0.18	0.34

1) Krypton/argon gas fills. 2) Transmittance normally stipulated on surface, light source D65, cf. EN410.

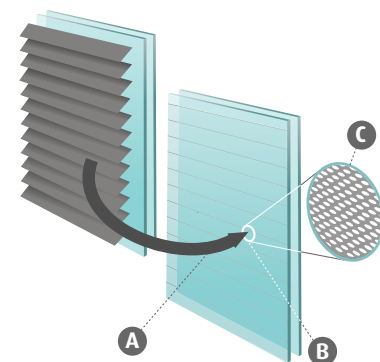
3) Reference sun-reducing glass with g₀-value of 0.36, cf. EN410. 4) Glazing unit selected as 6-15-4, including gas fill and energy glass.

Conventional exterior solar shading



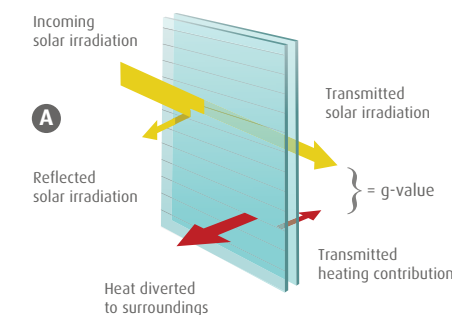
- A - High purchase price
- Requires maintenance
- Affects aesthetics
- B - Restricted view from inside

Micro-lamellas in glazing replace exterior solar shading



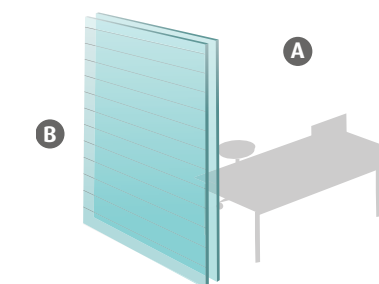
- A - Transparent MicroShade™ layer replaces exterior lamellas
- B - Layer fitted during production of the glazing pane
- C - Layer consists of micro-lamella structure

Provides effective shading when most needed



- A - MicroShade™ reflects solar and heat irradiation
- Most shading when the sun is high in the sky (summer)
- Least shading when the sun is low – more heating contribution (winter)

Facade with MicroShade™



- A - Comfortable temperature and daylight conditions indoors
- Unrestricted view
- B - Aesthetic facade free of exterior solar shading
- No maintenance
- Easy cleaning of glass

Green Economy

MicroShade™ is intelligent solar shading of glass facades which suits the sustainable buildings of the future. With its well thought-out design it is an effective and economical alternative to exterior solar shading – to purchase and to install in everyday use and in energy accounts.

With its integrated design, MicroShade™ is more economical than conventional shading solutions. The solution is encapsulated in the double or triple glazing, it is maintenance-free, has no moving parts and cannot be worn or damaged by extreme weather conditions, which can be the case with exterior shading systems.

Partnership with Leading Architects

PhotoSolar cooperates with the Danish Energy Agency, which is part of the Danish Ministry of Climate and Energy, and internationally recognised architects 3XN on further developing the MicroShade™ concept. The focus is on the aesthetic dimension and incorporating MicroShade™ in new “green” architectural solutions.



At 3XN we have always put beautiful design at the top of the agenda. On that basis we are now working in a targeted way to integrate sustainability into our visions. Environmentally friendly buildings do not mean boring architecture.

Kim Herforth Nielsen

Creative director and partner in 3XN



Expert Advice

MicroShade™ has been developed in partnership with leading Danish indoor climate experts, including the Danish Technological Institute. At PhotoSolar we have significant experience in this field. In fact, we do not do anything else.

If you have a facade project which calls for future-oriented solar shading, you are very welcome to contact us. We are prepared to assist you with advice and guidance and will be pleased to produce data specific to your project. We also assist in calculating the energy accounts for projects in which MicroShade™ is included in the overall solution.

MicroShade™ in Brief

MicroShade™ screens more than 2.5 times more solar energy away from the facade than sun-reducing glass. The performance is in line with exterior solar shading.

MicroShade™ is installed as standard double or triple glazing. Can be adapted to existing frames and fitted in most profile systems.

MicroShade™ does not require any maintenance. External and internal glass surfaces are cleaned as usual.



We look forward to hearing about your facade project

Let us help you to look at the possibilities and find solutions for your project. The aim is to reduce the building's cooling requirements and energy consumption while also ensuring the best daylight and temperature conditions. This benefits the users, the building owner and the environment.

MicroShade™ has been developed by PhotoSolar A/S. The company's mission is to create better working environments and reduce energy consumption in modern buildings with large glass facades. PhotoSolar is development-based and works in close partnership with major centres of expertise, including the Danish Technological Institute.

PhotoSolar specialises in advanced transparent solar shading and solar cell solutions and supplies the construction industry. Glazing panes with MicroShade™ are available from selected glazing manufacturers – contact us for details.

All information is intended as guidance. PhotoSolar A/S reserves the right to make amendments. None of the information provided is binding on PhotoSolar A/S.

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