

Window Films: Providing Solar Protection

Window Films provide safety, security, solar control, privacy and decorative advantages for building and transportation glazing.

Wherever solar protection is a concern, window films help improve thermal comfort, reduce fading in interiors and minimise UV rays.

Window films help protect against the damage the sun can cause. While window films alleviate many solar control issues, they are invisible: the application of film on a surface does not compromise the view through the window, nor the natural feel of the sun through a window.

Windows without solar control window films allow excessive visible light (glare), infrared (heat) and UV (ultra violet) to pass through, and this results in an array of challenges.

Benefits



Reduced heat leading to energy savings and improved thermal comfort



Reduced glare leading to increased visual comfort and productivity



Reduced UV damage to skin and eyes leading to improved health



Reduced fading leading to reduced damage to interior floors, furniture, carpets and artwork



Reduced wear on the glass leading to a longer life for windows and glazings, supporting sustainability

Window Films Help Save Energy

Since the 20th century, glass has increasingly been used in architecture.

Designers and architects choose glass because it helps make the building lighter, fills the interior with natural light and provides views to the outside.

Natural sunlight brings a variety of benefits; it helps save money on lighting.

Windows are indeed “low-energy light sources”,

and give occupants an idea of the time and weather.¹

But since glass is a poor insulator, heat gain and heat loss through glass can represent a significant portion of a building’s heating and cooling loads.

Windows typically account for 15 to 30% of the total heating load and may account for more than 50% during the summertime cooling load.²



When designers and architects choose to apply window films, the energy performance of a structure is improved.

With window films, aesthetics and energy performance can go hand-in-hand.^{3,4}

The Facts

- In the EU, buildings account for about 40% of energy consumption and 36% of CO2 emissions.⁵
- In developed countries energy consumption in the residential sector accounts for between 20% and 30% of the total energy used.⁶
- When it comes to windows, it is estimated that 85% of glazed areas in Europe’s buildings are inefficient with outdated glazing (for example, single glazing or early uncoated double glazing), and additionally with outdated framing (with poor airtightness, for example).
- Solar control window films do not only reduce heat build-up, temperature fluctuations and hot spots, but also energy use, therefore reducing HVAC expenditures. Reducing a building’s need for heating and cooling reduces fuel consumption as well as carbon dioxide emissions.
- All quality window films will block up to 99% of UV rays.²
- Window film applied to the interior of windows is a transparent “solar shield” that can reject up to 80% of the sun’s heat.²
- An EWFA Energy Study proved that installation of window films can significantly reduce total commercial building energy usage, over a variety of European climates, window types, and building sizes. For all models examined, the average building energy savings was 18%, with a global minimum of 2% and a maximum of 42%.⁷
- A recent exercise conducted in Barcelona to measure the before/after benefits of window films showed that the temperature on the roof of the building studied fell by 20°C after window films were installed, and the cooling cost of that building was reduced by 11%.⁸
- Currently, about 35% of the EU’s buildings are more than 50 years old and almost 75% of the building stock is energy inefficient, while only 0.4-1.2% (depending on the country) of the building stock is renovated each year. In addition, investments in energy efficiency can also stimulate the economy, in particular the construction industry, which generates about 9% of Europe’s GDP and directly accounts for 18 million direct jobs.⁹

Window Films Improve Thermal Comfort

Europeans spend on average 85 to 90% of their time indoors.

Whether in a building or a vehicle, solar heat entering through glazing can lead to uncomfortable temperatures for occupants.

Following the development of European standard EN 15251, specifying values for heating, ventilation and air-conditioning specialists to assess indoor thermal comfort, it is now possible to evaluate

in a harmonised way the impact of solar heat on indoor climate.^{10,11,12,13}

As glazings are the most heat conductive elements in buildings or vehicles, windows are crucial elements to fight against indoor heat and save on ventilation and air conditioning.

In Europe, heating and cooling represent 51% of the energy demand for residential, industry and tertiary buildings.

Thanks to their UV-blocking properties, solar control window films can dramatically reduce heat from entering through glazings and create a positive energy balance, which can help maintain optimum temperatures and preserve occupants' comfort.¹⁴

The Facts

- Around two-thirds of the energy lost from a standard window is through radiation through the glazing. Radiation is the heat transfer through glass in the form of light as an invisible spectra. Solar control window films can stop this infrared light.¹⁵
- With 50% (546 Mtoe) of final energy consumption in 2012, heating and cooling is Europe's biggest energy sector and is expected to remain so.¹⁶
- Currently, demand for heating in buildings and industry outweighs demand for cooling. However, the latter is gradually catching up, especially due to increasing demand for air conditioning or refrigeration of food and medical supplies. For example, according to the EU, by 2030 the energy used to cool buildings across Europe is likely to increase by 72%, while the energy used for heating buildings will fall by 30%.^{17,18}
- Window films applied to the interior of windows act as a transparent "solar shield" that can reject up to 80% of the sun's heat.¹⁹



Window Films Support Visual Comfort, Concentration & Productivity

Window films reduce glare on computer and mobile device screens. Glare is the loss of visual performance or discomfort produced by an intensity of light in the visual field greater than the intensity of light to which the eyes are adapted.

Simply put, glare occurs when too much light enters your eye and interferes with your eye's ability to manage it.

Glare can be distracting and even dangerous.²⁰

Excessive glare can contribute to a visually uncomfortable environment.

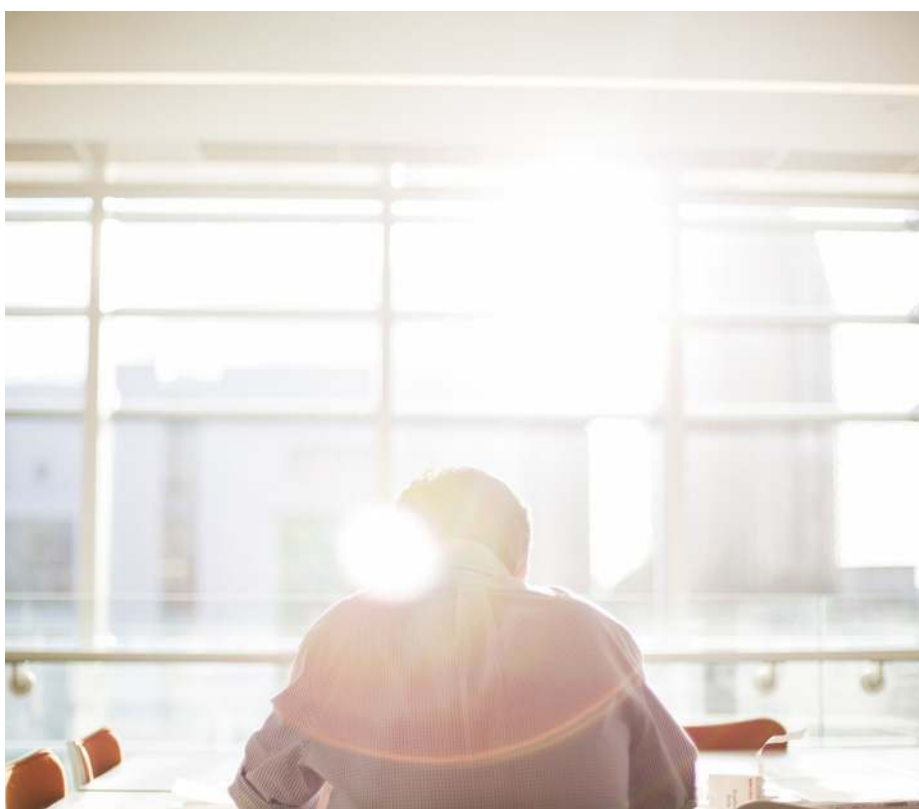
In any setting – whether a vehicle or a conventional office, a laboratory, shop floor, production plant, school or university - this can potentially increase fatigue and stress levels.

This is particularly a problem when working with display boards and/ or computer screens.

Solar control window films in buildings and vehicles can help to reduce eye strain by significantly reducing glare, without sacrificing the natural light, view through the window or view on the screen.

The Facts

- Daylight, like any light source, can act as a glare source, and can cause veiling luminances, reduced contrast, and lower task visibility. The presence of windows also has the potential for causing adaptation problems (and reduced visibility) if the window luminance is significantly higher than the room or task luminance.²¹
- Reflective glare resulting from nearby light sources reflecting off the monitor is one of the most frequent complaints related to computer use.^{22,23}
- Reflective glare can reduce image contrast and, if the glare is strong or localised, it may reduce visual acuity or induce discomfort.²⁴
- A study conducted in the Environmental Health Sciences division at the University of California, Berkeley, USA, examining the effects of computer display design on health and productivity showed that "Screen glare induced non-neutral upper body postures, including neck flexion, torso forward flexion, and head movement to the side."²⁵
- Eye focusing problems alone can cause an employee to lose up to 15 minutes of productivity per day, which equates to the equivalent of roughly EUR 1,800 per person, per year.²⁶



Window Films Protect Health

UV-protective window films will help minimise the damage the sun's ultraviolet (UV) rays can do to your skin and to your eyes in a very short period of time.

Window films can be installed on vehicles, commercial or residential buildings, blocking up to 99% of UV radiation.

Their installation is recommended by the Skin Cancer Foundation.²⁷



The Facts

- While UVA and UVB rays differ in how they affect the skin, they both do harm. Unprotected exposure to UVA and UVB damages the DNA in skin cells, producing genetic defects, or mutations, that can lead to skin cancer (as well as premature aging.) These rays can also cause eye damage, including cataracts and eyelid cancers.²⁸
- Research in Clinical Interventions in Aging showed that people who had daily indoor sun exposure, such as a storekeeper and a teacher, had more wrinkles on their cheek, wrinkles under the eyes, deeper crow's feet and more roughness on the window-exposed side of their face than on the non-window-exposed side.
- The areas of the subjects' faces that were regularly closer to a window exhibited more signs of sun damage and UVA rays are the culprit.²⁹
- UV damage to the eyes can start in as little as 15 minutes.³⁰
- The skin of people who are sensitive to light can't protect itself from UV radiation for long. In very fair-skinned people, UV radiation starts becoming harmful after about 5 to 10 minutes.³¹
- UV protection is particularly important in children of young age because of higher UV transmittance by the child eye structures.³²
- Research shows that a UV-protection film can reduce sun damage by 93%.³³

Window Films Reduce Fading

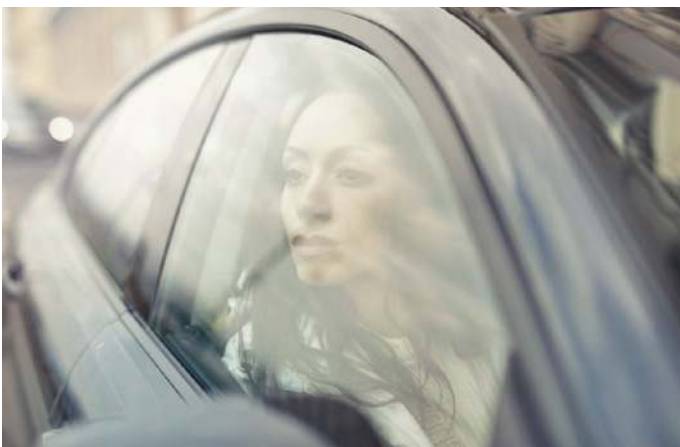
Fading is the degradation of pigments resulting in a change of appearance of an object to the human eye. It is caused by a number of factors, such as UV rays, heat and visible light. Even on cloudy days, when these wavelengths reach an object, they can break down the chemical bonds, fading the colours.

Exposure to UV rays and visible light can lead to fading of floors, furniture, carpets and artwork – sometimes causing irreparable damage.

Solar control window films significantly reduce the biggest contributor to fading: UV rays. Minimising UV rays helps to protect a building's interior or a vehicle's interior – as well as their contents - against fading. It also helps avoid maintenance or replacement costs.

The Facts

- Ultraviolet radiation (UV) is the single largest contributing factor in fading of fabrics, carpets and other furnishings. Although visible light, electric lighting, heating, humidity, age of fabrics and fabric dyes all play a part in the process, UV radiation is attributed to 40% of resulting damage.³⁴
- Some objects are more prone to fading – such as dyed textiles and watercolours.³⁵
- By rejecting up to 99% of UV rays (along with other contributors to fading such as heat and visible light) solar control window films can help reduce fading of interior fixtures and fittings.





Window Films Can Extend the Life of Windows and Glazings... Supporting Sustainability

Window films improve glazing properties and protect the glass, which is the most fragile part of the window. The application of window films, therefore, allows for a longer use of windows and glazings without the need for replacement.

This is a more sustainable choice, saving timber, reducing the production and use of PVC or aluminium and minimising glass waste.

Window films also allow flat glass to be recycled in a more straightforward way: disassembly of window film installed on glass is easy for recyclers, and because the glass is not tinted, the melting of the glass for reuse is easier.

The Facts

- While glass is the most fragile part of the window, reports show that aluminium and timber windows can easily last more than 40 years. Al-clad timber being new on the market, is expected to have a service life well over 40 years. PVC windows, in most cases, are reported to have an optimum service life of 25 years.^{36, 37}

Selecting and Installing the Right Window Film

There are many types of solar control window film, each offering a unique combination of benefits. Window films are available in a variety of grades, shades and tones.

The correct product will depend on many factors such as the building and glass specifics, or the vehicle's requirements - and the combination of benefits you wish to receive.

Due to the way that various window film technologies behave, a solar control window film should never be chosen purely on appearance and shade, and must always be installed by sector professionals.

Always seek professional advice from an [EWFA member company](#).

(Link: <https://iwfa.com/ewfa/en-us/Membership/Our-Members>)

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