

Passive Energy Reduction Technology

Solar Shades

"Reducing the Carbon Footprint of Commercial Buildings"

NET ZERO
CARBON & ENERGY



Inflector Solar Shades

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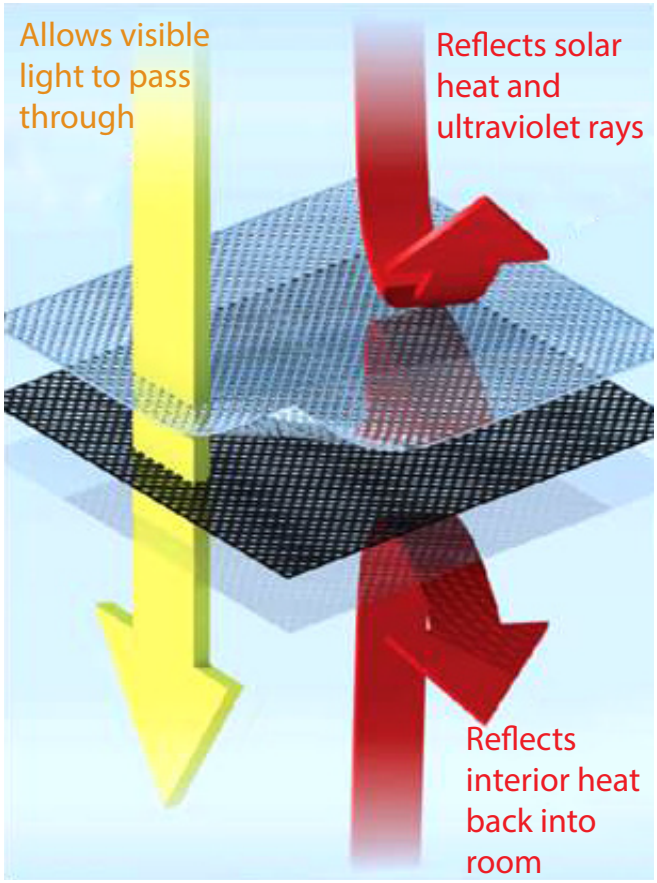
Designed from a NASA developed technology.

What are Solar Shades?

Solar Shades are a unique, energy saving product which acts as a solar filtering, reflective thermal shade. Solar Shades stabilises the indoor temperature by allowing in natural light and reflecting back solar heat and UV rays, providing a safer, more comfortable environment along with lower energy bills.

Solar Shades addresses all of the seasonal changes by retaining heat in the building during winter and reducing heat gain by the building during the summer. It provides a permanent solution for high energy bills.

The Solar Shades technology was initially developed by NASA in the 1960s, for the space suits worn by astronauts. It was the only material capable of combating the extremes of heat and cold in space. The material consists of micro thin layers of dielectric coatings with high and low refractive indexes combined with micro-thin layers of highly reflective aluminium. The metal is coated to a polyethylene sheet, laminated to a sheet of carbon graphite PVC which is then perforated, embossed, and laminated to a sheet of clear UV filtering polyester. The overall thickness of the material is 0.4mm.



Solar Shades are the result of many years of research and development, refined into the product we offer you today.

Innovative Window Insulation Technology

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A passive solution which addresses more than just the reflectance of solar heat gain.

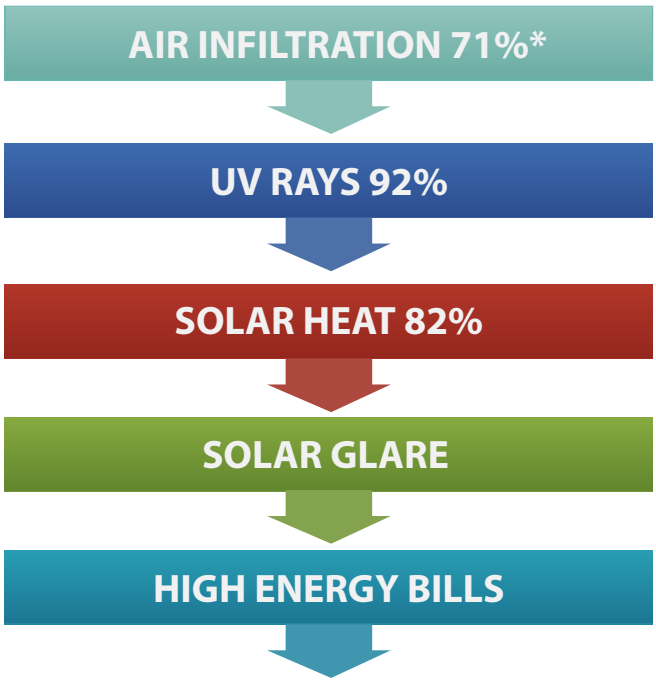
The Solar Shades work on the basis of its three properties listed below. Aluminium was chosen to address the first two properties:

1. **Reflectivity** - to reflect solar heat gain back out through the window
2. **Emissivity** - most importantly aluminium has a low emissivity of between 0.03 and 0.05. This means that only 3% to 5% of radiant heat is emitted through the aluminium.
3. **Absorption** - the reverse side (black side) of the Inflector material acts as a one-way passive solar collector; absorbing the sun's rays and radiating the heat into the building thus reducing the load on the heating system.



Solar Shades are uniquely engineered to provide solar filtering and offer a range of installation options to suit the building's interior design. The reflective t hermal s hades a id i n s tabilising i ndoor temperature allowing natural light in and reflecting back solar heat and UV rays to create a safer, more comfortable environment along with lower energy bills.

Solar Shades prevents:



Windows are the weakest part of the building envelope

Windows allow unwanted glare, heat & damaging UV rays to enter buildings and generated heat to escape.

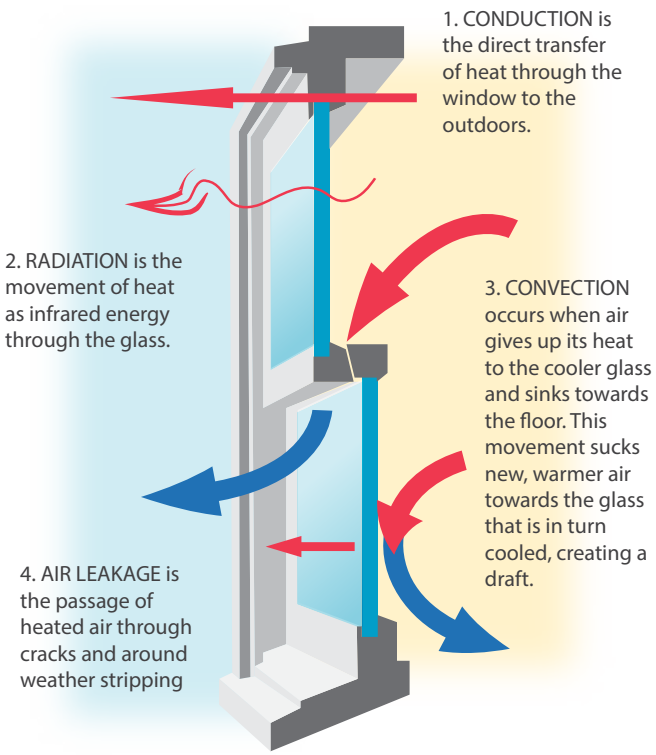
Windows are the weakest part of the building envelope and account for heat gain within a building in the summer and heat loss in the winter. Heat gain increases cooling costs and heat loss increases heating costs. In reality windows are thermal sink holes.

A single pane clear window is 20 times less energy efficient than the wall area they replace; and double pane Low-E windows are 10 times less energy efficient than the wall area they replace. This means that on average a building can lose more than 30% of its heat or air conditioning energy through its windows.

While the amount of heat loss or heat gain through windows depends on whether the windows are single pane glass, clear double pane, Low-E coated, or gas filled, the fact is if you have windows you have heat gain and or heat loss every day of every year.

Windows lose and gain heat through a combination of four factors, namely:

1. Conduction
2. Radiation
3. Convection
4. Air Leakage



"Up to 87% of a home's heating energy can be gained and up to 40% lost through windows. Improving your glazing's thermal performance will reduce energy costs"

www.yourhome.gov.au/passive-design/glazing - 2021

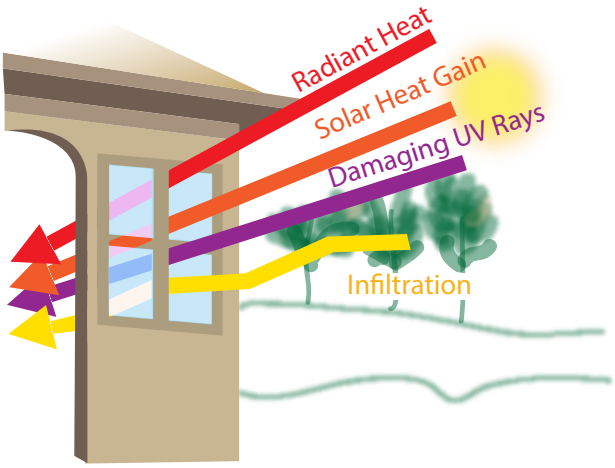
Seasonal Effects on Buildings

Heating and cooling systems can account for over 65% of the overall energy consumption in office buildings.

Summer

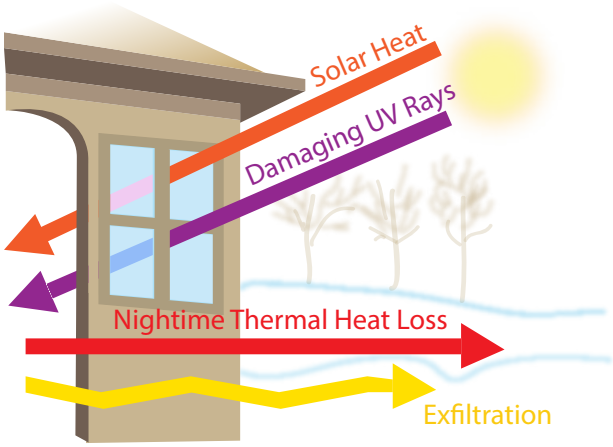
In summer windows provide desirable daylight and a view, but also allow infiltration, unwanted glare, heat gain and damaging UV rays to enter buildings. This results in:

- increased greenhouse effect
- increasing interior temperatures
- high cooling/air conditioning costs
- decreasing comfort and reduced worker productivity
- UV damage to furniture, carpets, etc.



Winter

While windows allow daylight and solar gain which we want in the winter they also allow the sun's damaging UV rays to enter through the windows. Additionally, heat escapes through the windows when it is colder outside than inside. There is also heat loss due to exfiltration (air leakage).



"In 2020 buildings accounted for about 25% of all the Australia's carbon emissions"

BDAA - Building Designers of Australia Association

Solar Shades during Summer months

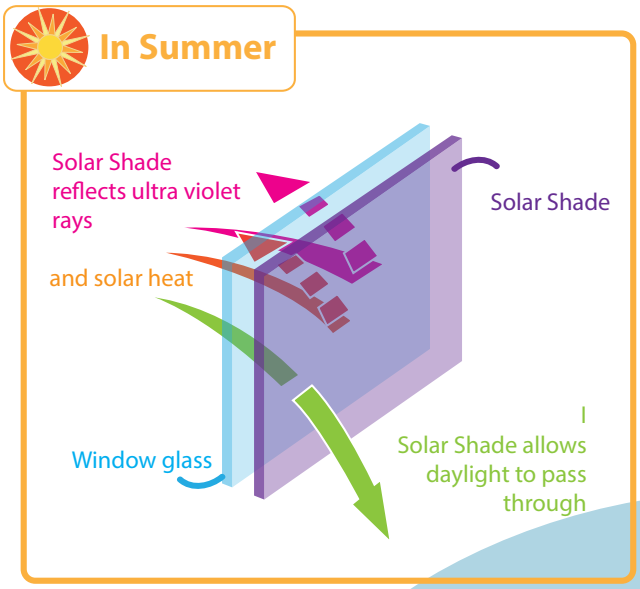
Solar Shades offer an immediate reduction in energy costs and a return on investment of 2.5 + years.

Solar Shades address all deficiencies of the building envelope pertaining to windows. The shades effectively give beneficial control over reflectivity, emissivity, absorption, radiant heat gain, solar heat gain, privacy, infiltration, condensation and heat loss in the winter; as well as being a passive solar collector, absorbing sunlight and radiating free heat into the building.

Summer Benefits & Value

In the summer the Solar Shades are positioned so that the silver side faces out which:

- reflects 72% of radiant heat back out through the window (reducing the greenhouse effect in buildings)
- reflects 65% of solar gain back out through the window (reducing overheating in buildings)
- reflects 92% of damaging UV rays back out through the windows (reducing fading & sun damage)
- reduces cooling requirements saving energy, CO2 and money
- controls glare (especially for computers & televisions)
- provides daytime privacy (one way vision)
- provide cool day lighting with a view
- reduces the load, wear, & maintenance on HVAC units



Solar heat reflected from a building due to installing Solar Shades

Window Type	Percentage heat coming through the window		Incoming heat reduction using Inflector
	Without Inflector	With Inflector	
Single Pane	85%	17%	80%
Double Pane	70%	15%	78.8%
Double Pane Low-E	54%	13%	75.9%

Solar Shades during Winter months

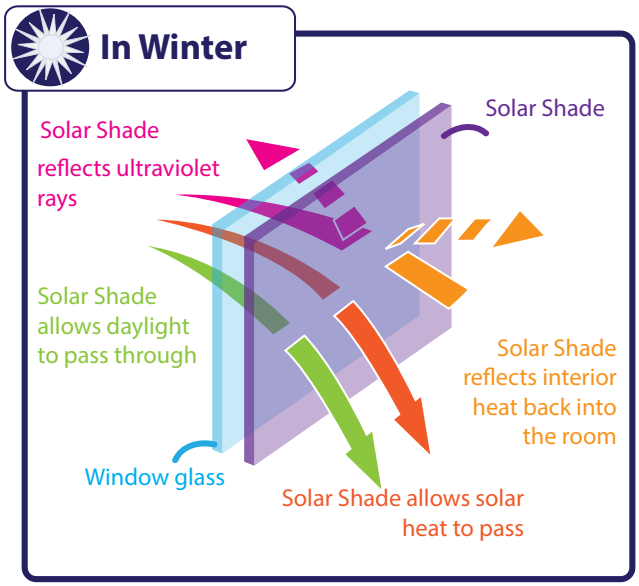
Solar Shades act as a solar collector in Winter, radiating heat into the buildings thereby reducing heating costs.

Winter Benefits & Value

In the winter the Solar Shades are reversed so that the silver side (aluminium) is facing inward to reflect the thermal heat back into the building and reduce heat loss through the windows.

Windows with direct exposure to the sun become passive solar collectors with the black side of the Solar Shades absorbing the sun's rays and radiating the heat inward. For example a 1.5m^2 window with an Solar Shades panel in direct sunlight can produce 2,096 BTU's of heat per hour, which is equivalent to a 600 watt electric heater.

- damaging UV rays are reflected back outside
- the load, wear, & maintenance on HVAC units is reduced
- reduces heating requirements saving energy, CO2 and money



Solar Shades Application

More cost effective & energy efficient than replacing the windows or window treatments.

The Solar Shades will be of particular interest to commercial property owners, property management companies & facilities managers looking to lower energy costs and increase the thermal comfort within their buildings. They offer:

- increased occupier comfort and reduced complaints
- tenant retention due to more usable space – eliminates hot and cold spots
- updates building appearance without changing the overall exterior appearance
- rapid return on investment



Solar Shades are a proven alternative to window replacement offering a more cost effective, energy efficient and significantly less disruptive option.

The Solar Shades installation below highlights the difference in Visible Light Transmission (VTL) through the Inflector shades and the row of style block-out shades above. The block-out shades simply heat-up and radiate the heat into the building adding to HVAC demands and worsening the occupants' thermal comfort.

Inflector has been installed in a variety of buildings across Australia including the QVB Building Sydney, Lismore Library, Narellan Library, Aeris Environmental, Lismore Hospital, Logan City Council, Regional Health Care and Lismore Workers Club.

Installation Options

Solar Shades can be installed as either a roller blind as in the library opposite, a fitted screen as shown below or as a vertical blind shown overleaf. The internal and external pictures of the office below demonstrate how Solar Shades provides daytime privacy for the occupants within the building without significantly compromising their view.

Configured as vertical blinds provides the easiest switch from silver to black, dependent on season and offers a very effective retrofit option to any existing standard vertical blind installations.

Blind Dimensions

Choice of vertical or roller blinds – max. 4m long

Vertical blinds: 89mm or 127mm vane width

Roller blinds: up to 130cm wide.

Solar Shades Performance Results

SOLAR ENERGY REJECTION	DAYLIGHT ILLUMINATION	ENERGY SAVINGS (HEATING & AIR CON)	PAYBACK
82%	Over 4850LUX	Up to 45%	2.5 + Years



Visibility through In Solar Shades con igured as vertical blinds.

SOLAR ENERGY	
Transmittance	17%
Reflectance	44%
Absorbance	39%
VISIBLE LIGHT	
Transmittance	25%
Reflectance Out	49%
Reflectance In	6%
PERFORMANCE INDICATORS	
UV Light Blocked	92%
Infrared Light Blocked	84%
Emissivity	0.9%
Total Solar Energy Rejected	82%
Retrofit Arrangement (Double Glazed Unit)	
Shading Coefficient	0.3
Solar Heat Gain Coefficient (G Value)	0.25
U Value - W/m2K (DGU)	1.48
TECHNICAL SPECIFICATIONS	
Weight (g/m^2)	284.6
Thickness (mm)	0.43
Flame Spread Index	0
Smoke Development Index	105
Tensile Strength MD (daN/mm^2)	2.44
Elongation at Maximum Load MD	62.69%

Put our services to the test, contact us for a free consultation today.

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