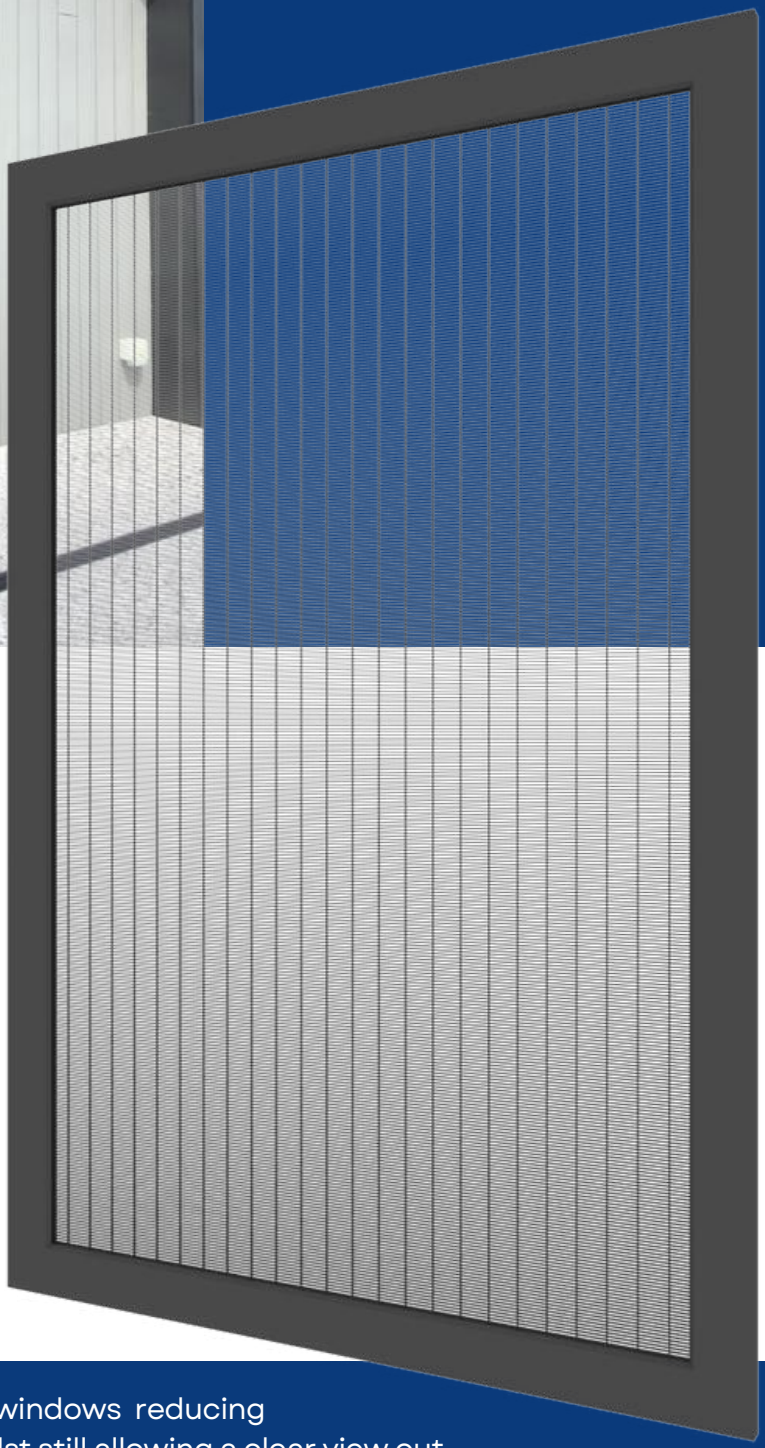
KOOLSHADE®

TECHNICAL PRODUCT GUIDE

The most effective, sustainable, passive solar shading system

- Reducing the need & cost of air-con by **68%+**
- Recycled, recyclable, no plastics, net zero
- Durable & Long Lasting
- Environmentally Conscious
- Non-mechanical Cooling



- **HEIGHTS UP TO 3 metres**
- **WIDTHS UP TO 1.8 metres**
- **ANY SHAPE OR COLOUR**

FIRE PERFORMANCE

Building Attack Level Protection:

- **BAL/FZ/BAL-40 AS3959**

Fire/Heat Attenuation:

- **49.4% CSIRO**

Burning Ember Exclusion:

- **BAL-FZ AS3959-2009 100% (>1.2mm)**

Reaction to fire:

- **A1/A2-s1,d0:BSEN 13501 - 2007+A1:2009**

KoolShade® Screens fit easily on the outside of windows reducing the amount of heat gain and direct sunlight whilst still allowing a clear view out.


THE LARGER THE PROJECT, THE GREATER THE ENERGY SAVINGS **AND** THE BETTER FOR OCCUPANTS
FOR NEW CONSTRUCTION & RETROFIT PROJECTS

KOOLSHADE® CONSTRUCTION

Frame options:

Various to suit application

Frame composition:

Extrusions - Aluminium EN AW6063 T6

Lacer Wire:

316 Stainless Steel

Anti-Vibration Wedge :

EPDM

Finishes:

Polyester powder coat in any RAL colour (with the ability to create designs on the fabric which are directionally visible)

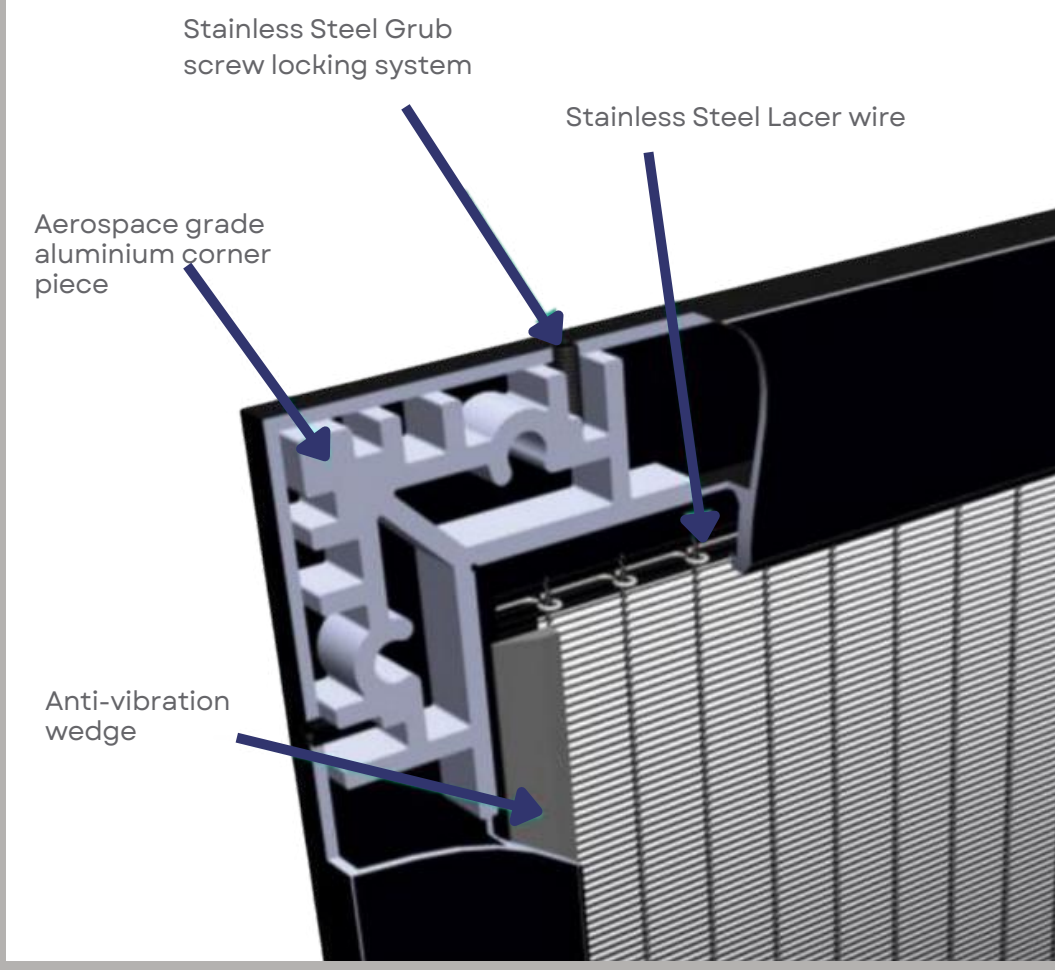
Fire rating:

Class A1/A2-s1,d0 in accordance with BS EN 13501-1:2007+A1:2009

FHA bushfire system provides protection to AS3959 up to BAL-FZ

Resistance to wind:

Hurricane proof: 100mph/160kph



As a result of decades of extensive international research and development, KoolShade is a high-performance, woven metal fabric, with its weft construction of bronze louvres.

Window covering screens are constructed by tensioning the fabric in aluminium framing and incorporating an anti-vibration wedge to enhance the screen's integrity at wind speeds in excess of 100mph/160kph.

The micro-fine louvres are angled to suit a number of applications; whether to ensure optimum light in, and visibility out, whilst blocking heat and glare, or to allow ventilation and even provide privacy from external viewing.

stop the sun's heat 100% GUARANTEED

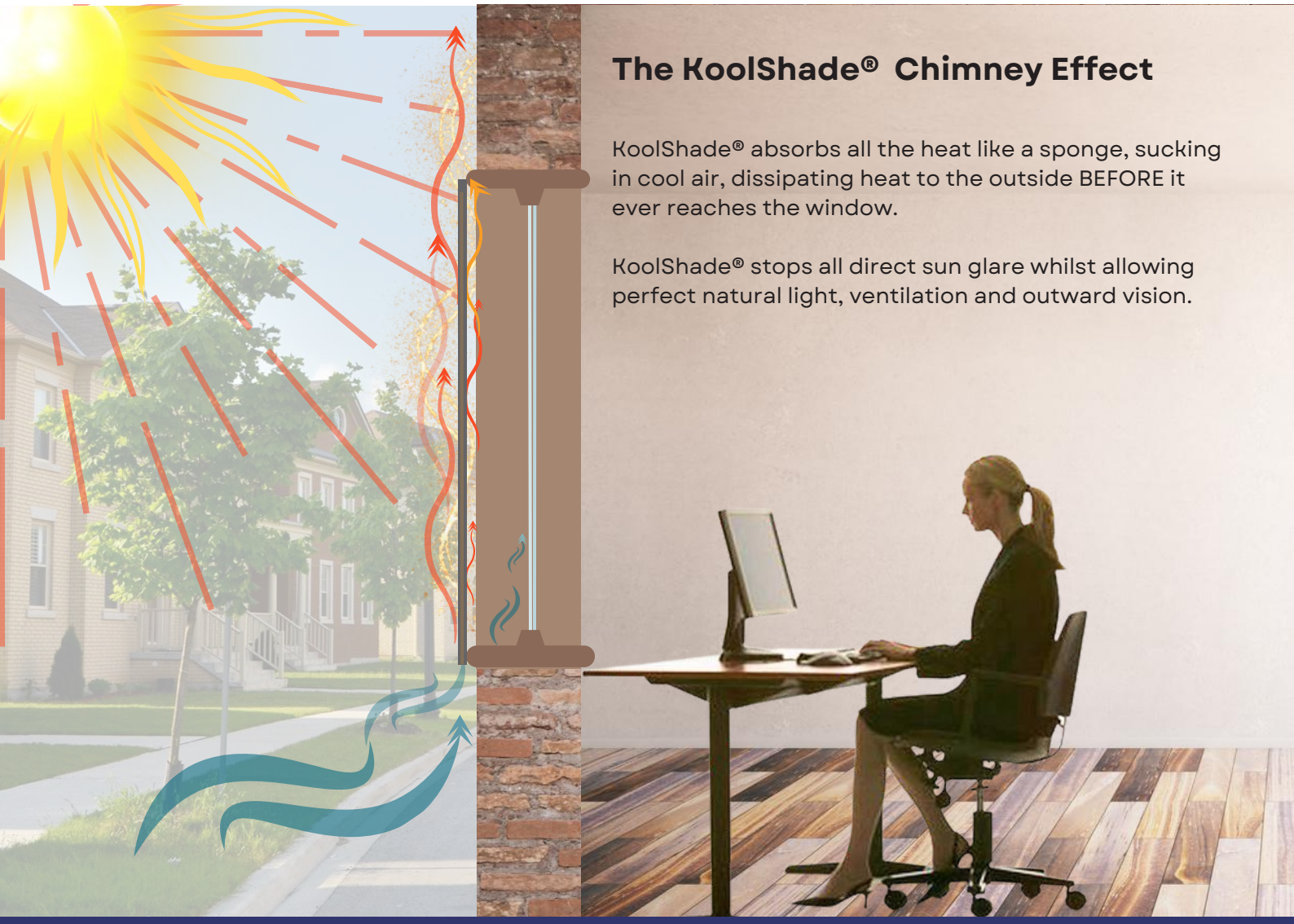
faulty materials & workmanship 50 year WARRANTY

THE PRODUCT

KoolShade® is a miniaturised angular selective solar shading solution that has been scientifically designed to provide:

- Excellent solar heat protection
- Uninterrupted view to the outside
- Balanced daylighting & glare control
- No upward light pollution
- Energy conservation

How it works



The KoolShade® Chimney Effect

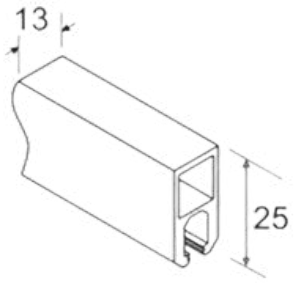
KoolShade® absorbs all the heat like a sponge, sucking in cool air, dissipating heat to the outside BEFORE it ever reaches the window.

KoolShade® stops all direct sun glare whilst allowing perfect natural light, ventilation and outward vision.

For architects, designers, consultants, and building service engineers focused on energy-efficient building envelopes, architectural facades, and highly glazed structures.

SCREEN WEIGHTS IN KILOGRAMS (KG)

FE25

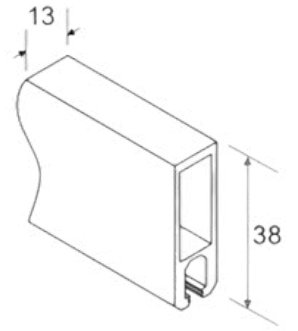


DROP	WIDTH 400mm	600mm	800mm	1000mm	1200mm
400mm	0.92	1.18	1.44	1.70	1.97
600mm	1.19	1.50	1.81	2.12	2.43
800mm	1.46	1.82	2.17	2.53	2.89
1000mm	1.73	2.13	2.54	2.94	3.35
1200mm	1.99	2.45	2.90	3.36	3.81
1400mm	2.26	2.76	3.27	3.77	4.27
1600mm	2.53	3.08	3.63	4.18	4.73
1800mm	2.80	3.40	3.99	4.59	5.19

Screens of these sizes require care when hinged. Please refer to SmartLouvre for advice.

TRACKS	DT34 + DT34
Vertical Sliding Overlapping	0.38
	0.58
	0.77
	0.96
	1.15
	1.34
	1.54
	1.73

FE38

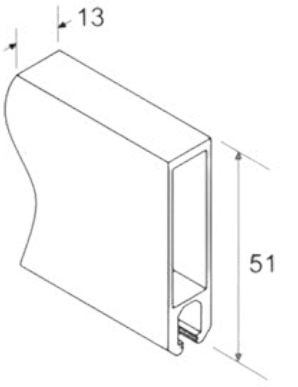


DROP	WIDTH 400mm	600mm	800mm	1000mm	1200mm	1400mm	1600mm
400mm	1.12	1.42	1.73	2.04	2.34	2.65	2.96
600mm	1.43	1.79	2.14	2.50	2.85	3.21	3.56
800mm	1.74	2.15	2.55	2.96	3.36	3.76	4.17
1000mm	2.06	2.51	2.96	3.42	3.87	4.32	4.77
1200mm	2.37	2.87	3.37	3.87	4.38	4.88	5.38
1400mm	2.69	3.24	3.78	4.33	4.88	5.43	5.98
1600mm	3.00	3.60	4.20	4.79	5.39	5.99	6.59
1800mm	3.31	3.96	4.61	5.25	5.90	6.54	7.19
2000mm	3.63	4.32	5.02	5.71	6.41	7.10	7.79
2200mm	3.94	4.69	5.43	6.17	6.91	7.66	
2400mm	4.26	5.05	5.84	6.63	7.42	8.21	

Screens of these sizes require care when hinged. Please refer to SmartLouvre for advice.

TRACKS	DT34 + DT34
	0.38
	0.58
	0.77
	0.96
	1.15
	1.34
	1.54
	1.73
	1.92
	2.11
	2.30

FE51



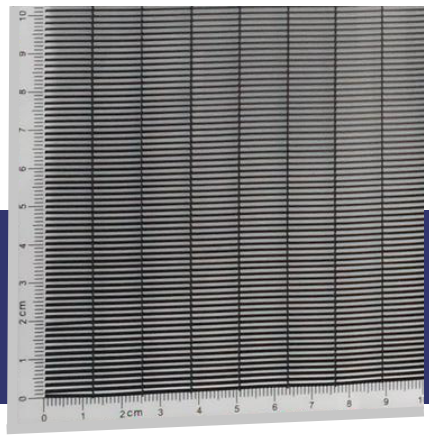
DROP	WIDTH 400mm	600mm	800mm	1000mm	1200mm	1400mm	1600mm	1800mm
400mm	1.40	1.76	2.11	2.47	2.82	3.18	3.53	3.89
600mm	1.77	2.17	2.57	2.98	3.38	3.78	4.19	4.59
800mm	2.13	2.58	3.03	3.48	3.94	4.39	4.84	5.29
1000mm	2.49	2.99	3.49	3.99	4.49	4.99	5.49	5.99
1200mm	2.85	3.40	3.95	4.50	5.05	5.60	6.14	6.69
1400mm	3.21	3.81	4.41	5.01	5.60	6.20	6.80	7.39
1600mm	3.58	4.22	4.87	5.51	6.16	6.80	7.45	8.09
1800mm	3.94	4.63	5.33	6.02	6.71	7.71	8.10	8.80
2000mm	4.30	5.04	5.78	6.53	7.27	8.01	8.75	9.50
2200mm	4.66	5.45	6.24	7.03	7.83	8.62	9.41	10.20
2400mm	5.02	5.86	6.70	7.54	8.38	9.22	10.06	10.90
2600mm	5.39	6.27	7.16	8.05	8.94	9.82	10.71	11.60
2800mm	5.75	6.68	7.62	8.56	9.49	10.43	11.36	12.30
3000mm	6.11	7.09	8.08	9.06	10.05	11.03	12.02	13.00

TRACKS	CODE	WIDTH	400mm	600mm	800mm	1000mm	1200mm	1400mm	1600mm	1800mm
	DT34 + BT32	Lift in/Lift out	0.31	0.47	0.62	0.78	0.94	1.09	1.25	1.40
	RT37 + DT34	Lateral Sliding	0.46	0.70	0.93	1.16	1.39	1.62	1.86	2.09

IMPORTANT: Smartlouvre reserves the right to change prices or specifications without prior notice. Nominal weights are in Kg. All dimensions are nominal. Metric to imperial conversions are to the nearest 1/8th". Subject to Smartlouvre Standard Terms and Conditions copies of which are on our website.

KoolShade® COLOURS & PRINTS

The standard KoolShade® Fabric colours are:



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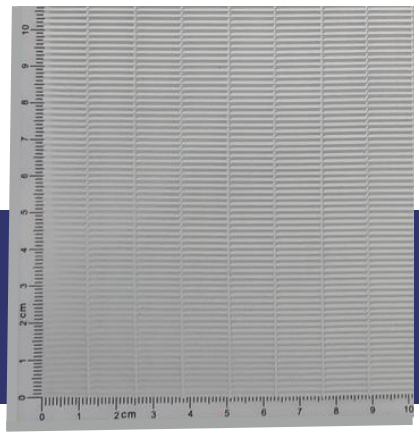


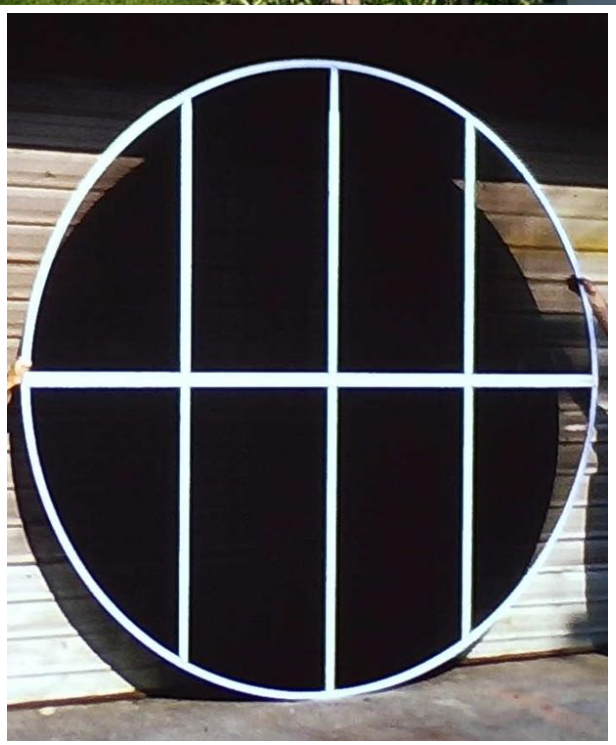
WHITE

BRONZE

Bespoke Fabric & Frame colours, any shade, any hue are available & PPC Powder Coated.

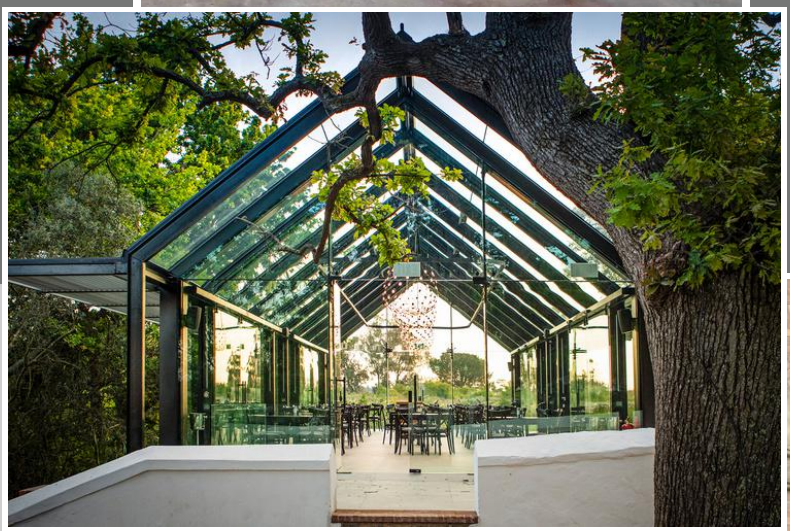
Bespoke printing: UV stable 5 colour printing up to 2m x 3m

BESPOKE SHAPES



KoolShade®

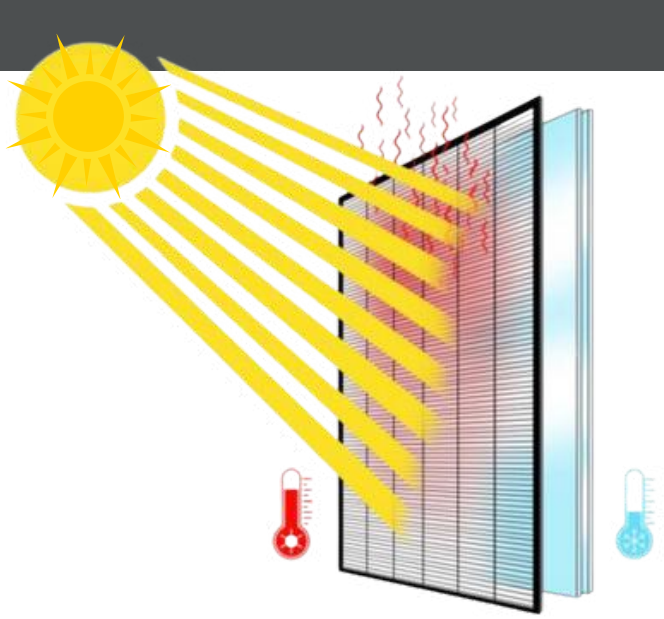
The Ultimate In Passive Solar Shading

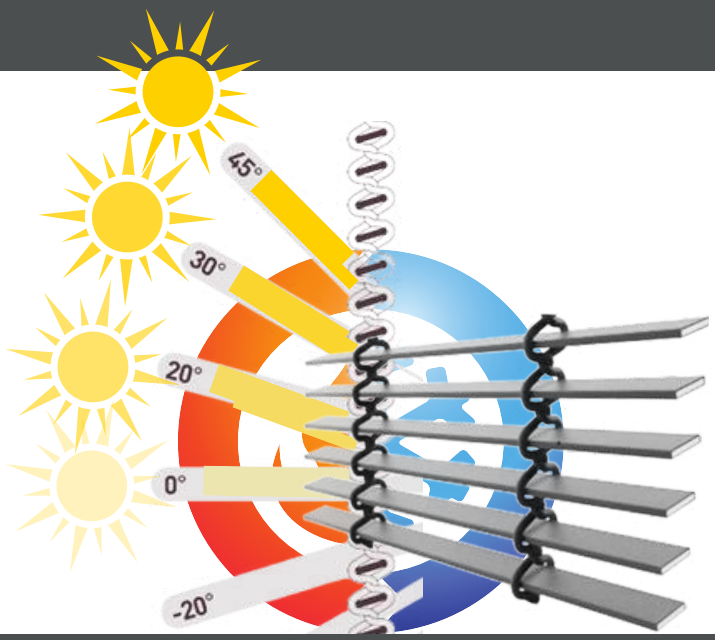


HOW IT WORKS

The system is thermally broken from a building with a typical 30mm gap between the fabric and window glass, so the sun cannot hit the glazing.

This creates an upward air-flow or chimney effect, driving the air surrounding the screen upward, pulling cool air past the glass and convecting the heat back out to the atmosphere.





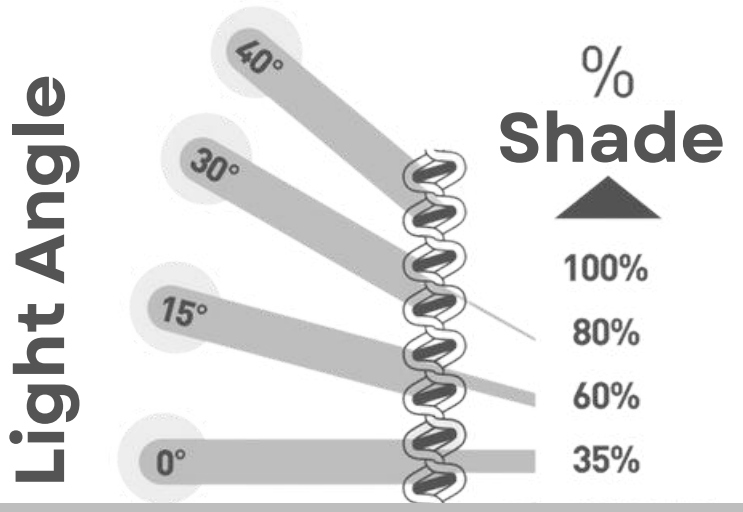
KoolShade® is fitted externally to the window or building façade and is typically coated in a matt black, which is designed to absorb the sun's radiation like a sponge, blocking the sun's heat at the window.

Due to the super-absorbing commercial bronze 1.25mm paper-thin micro louvres, there is very little thermal mass. Therefore, the heat transfers very quickly.

It's like when aluminium foil comes out of the oven, it cools almost instantly. They both have a very high surface area but a small mass, so they lose their stored heat rapidly.

SUN CUT OFF ANGLES

Fraunhofer ISE states that MicroLouvre KoolShade® fabric is an angle-selective product, therefore angle-dependent transmittance and reflectance values have been tested at positive and negative angles of incidence.



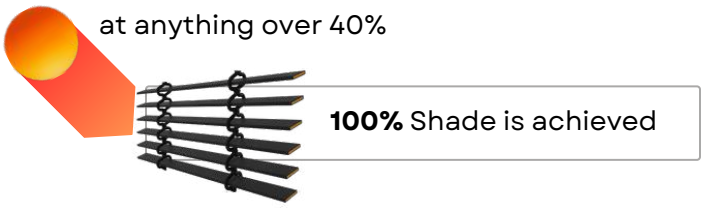
When the sun is at its hottest, at anything over 40°, full solar heat block is achieved.

As the sun passes between 15° and 30°, between 60 & 80 heat block will be seen.

When the weak morning and dusk sun is shining 35% of the heat is blocked.

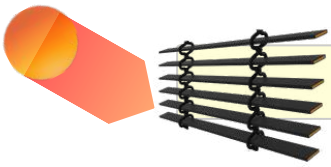
Fraunhofer

When the sun is at its **strongest,** at anything over 40%



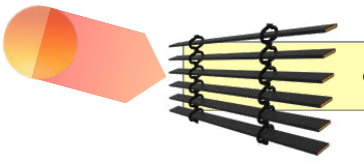
100% Shade is achieved

When the sun is at 30%



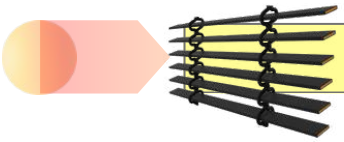
80% Shade is achieved

When the sun is at 15%



60% Shade is achieved

When the sun is it's **weakest** at 0%



35% Shade is achieved

This illustrates the shading performance of KoolShade®

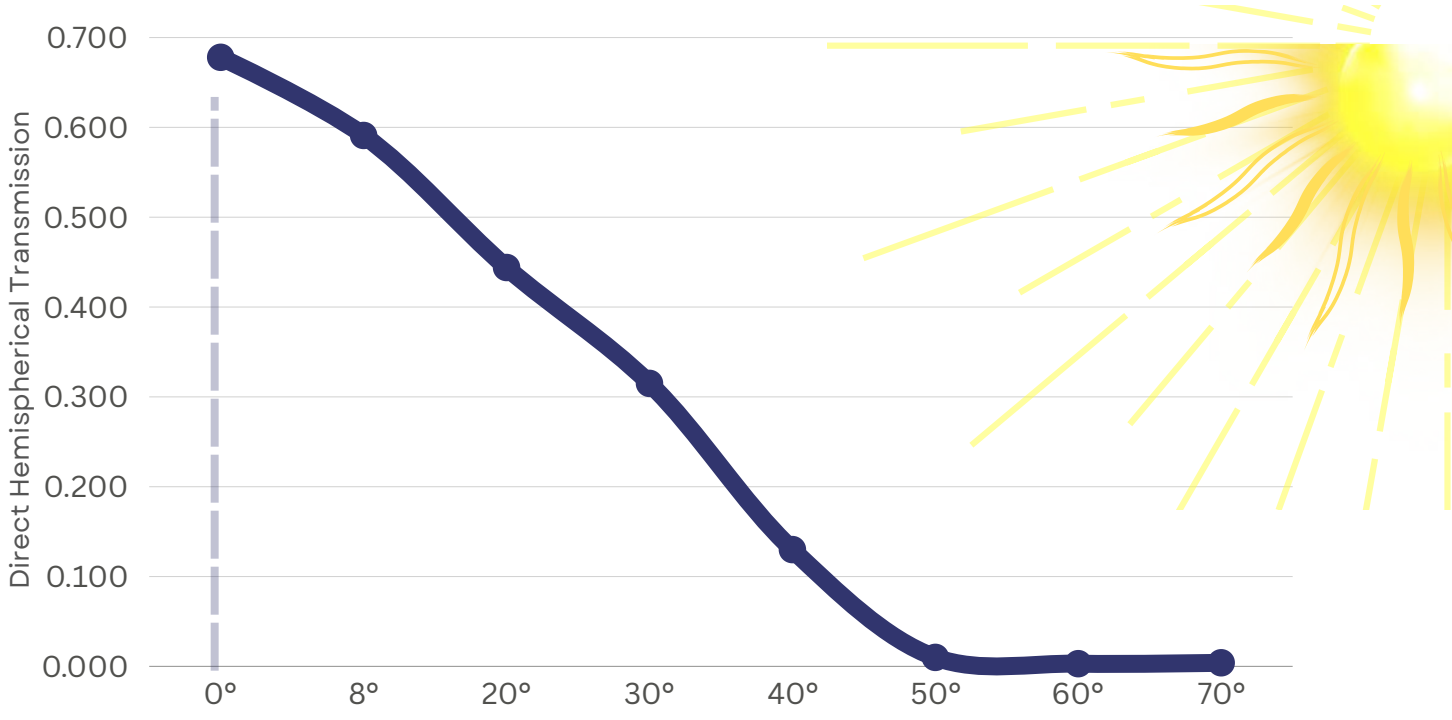
The defined standards of EN14501, intended primarily for glass & glazing, specify reporting results only at normal incidence (0°) i.e. the sun's rays are only sunrise & sunset and thus do not adequately indicate true performance at other, highly relevant angles of incidence.

Angular Dependent: meaning that the performance varies with the position of the solar altitude.

ANGLE DEPENDENT SOLAR DATA

Fraunhofer Test Results from K700-17 Fabric

Angular Dependant Solar Transmission



Solar Transmission Angle
The direct sun's rays during the day.

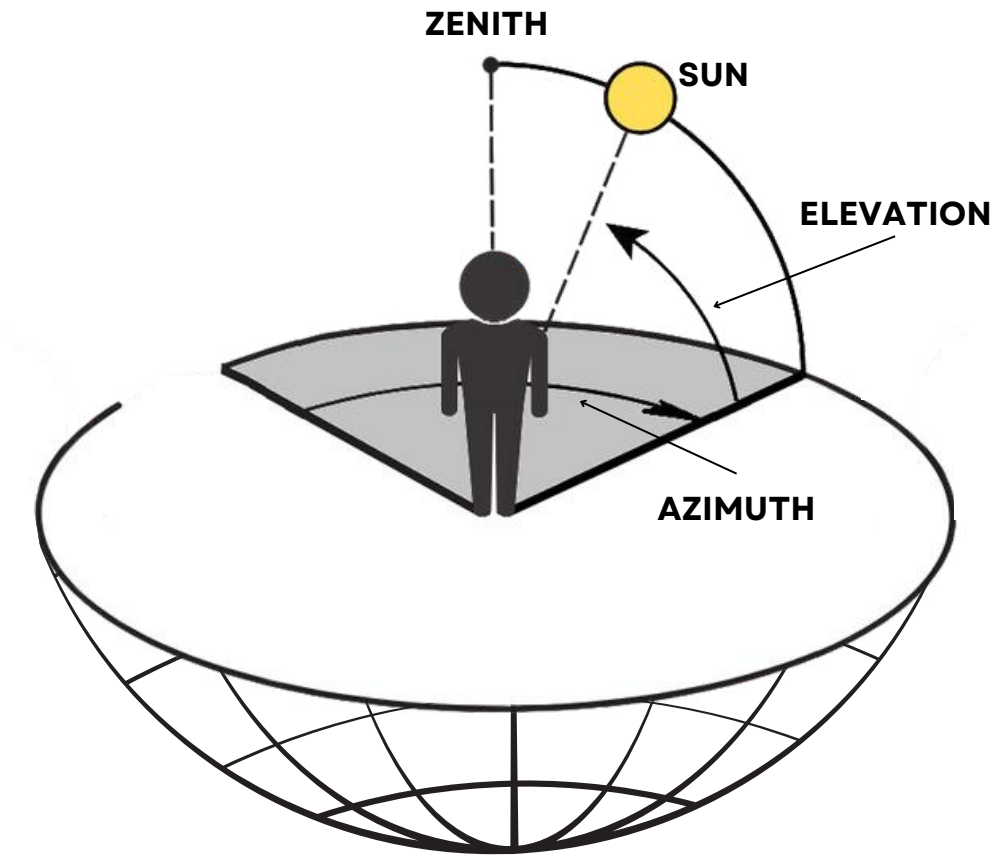
This illustrates MicroLouvre KoolShade® fabric - Solar Transmittance, Reflectance & Absorptance among different angles

	τ_e Solar Transmittance	ρ_e Solar Reflectance	α_e Solar Absorptance
70°	0.004	0.046	0.950
60°	0.003	0.036	0.961
50°	0.010	0.025	0.965
40°	0.130	0.015	0.855
30°	0.315	0.009	0.676
20°	0.444	0.004	0.552
8°	0.591	0.003	0.406
0°	0.678	0.002	0.320
-8°	0.743	0.001	0.256
-20°	0.778	0.001	0.221
-30°	0.700	0.003	0.297
-40°	0.525	0.004	0.471
-50°	0.265	0.008	0.727
-60°	0.040	0.010	0.950
-70°	0.019	0.012	0.969

WHAT IS ANGULAR SELECTIVE?

Angular Selective: is a special case of angular dependence. Angular selective means that the performance varies with the position of the sun, both in the solar altitude direction and azimuth direction.

In this figure, the two directions are illustrated.



The angular selective performance in the solar altitude direction is the most important of the two directions. However, the **azimuth** angle can also be very significant, with angular selective shading systems.

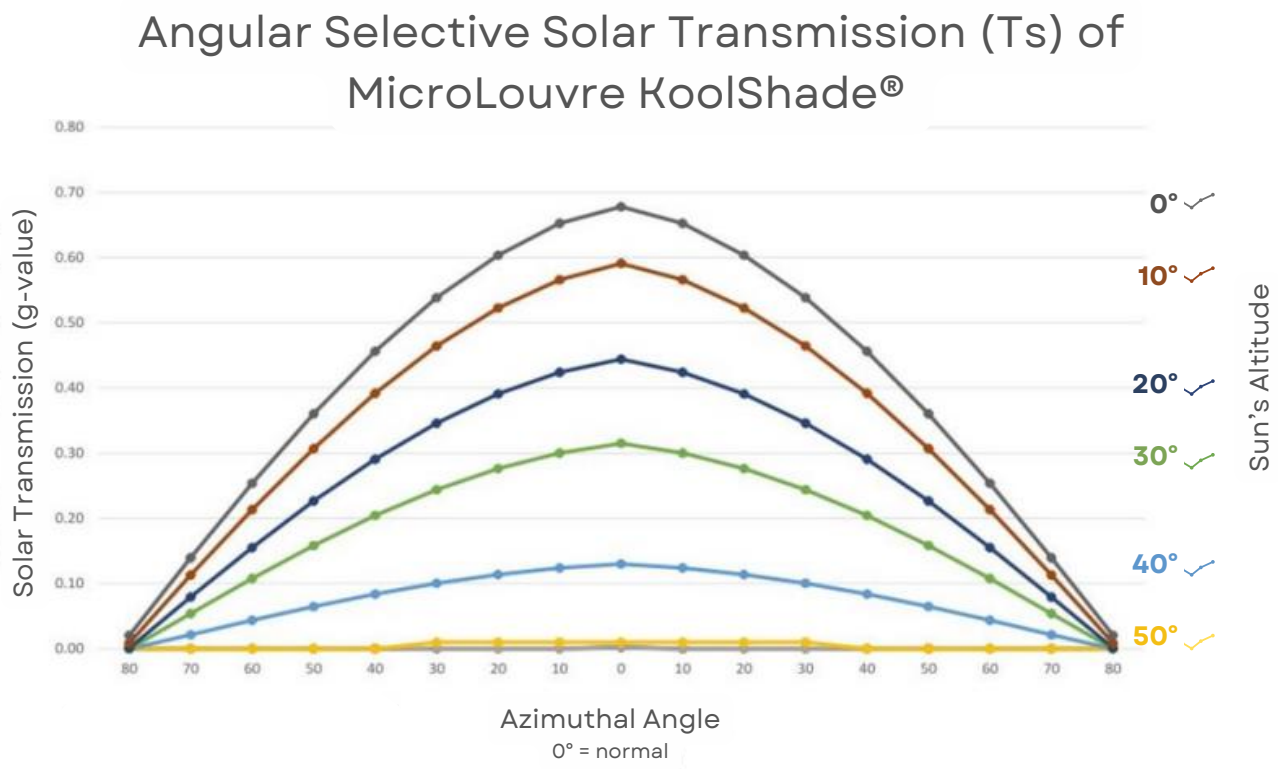
Therefore, it will give the most accurate results if both directions are considered.

The performance is always angular selective, as the sun never stops moving in both directions.

***Azimuth** angle is the compass direction from which the sunlight is coming and it varies throughout the day

ANGULAR SELECTIVE SOLAR TRANSMISSION OF MICROLOUVRE KOOLSHADE®

Angular selective shading systems are generally static, energy efficient window treatments that are suitable for new construction or retrofit projects.

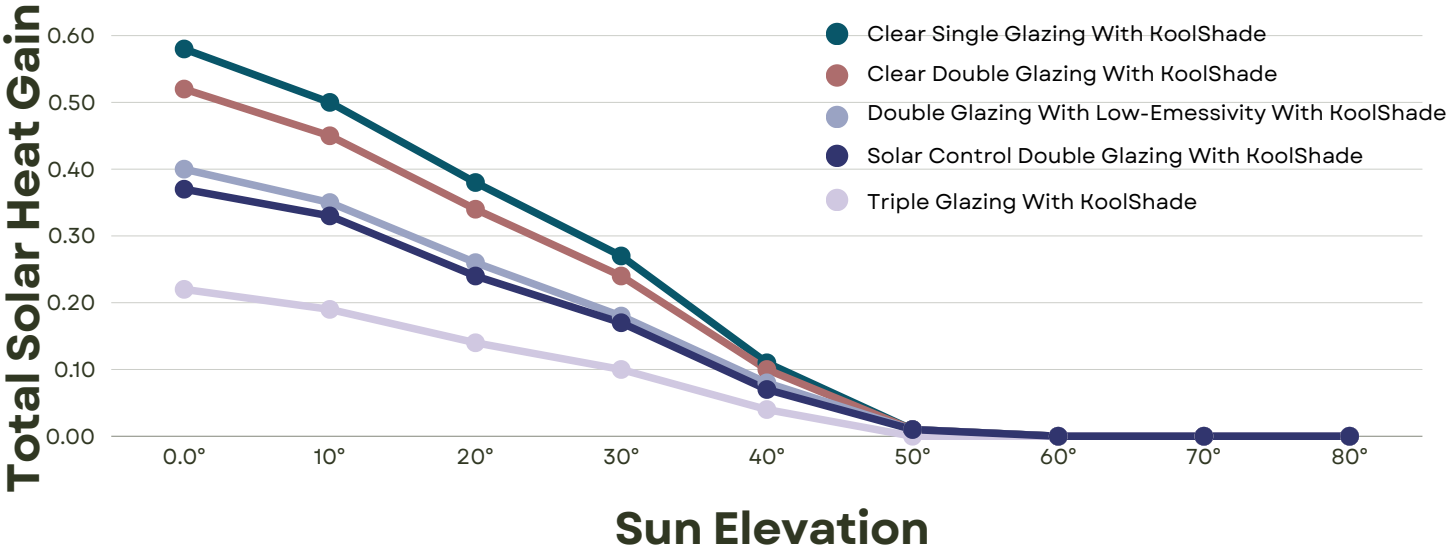


They block or filter direct sunlight while allowing diffused daylight to pass through windows within a specific range. Static, angular selective shading systems offer a potentially low-cost option to reduce window heat gains and control glare while permitting the admission of useful daylight, natural ventilation and access to views.

These passive systems are optically complex, designed to have characteristics that allow them to selectively assume different properties related to the solar transmission.

Building computer simulation software allows accurate modelling of the behaviour of optically complex fenestration systems such
as angular selective systems.

KOOLSHADE®
WITH GLASS



Based on European Standards EN14501, EN145000 and EN52022.
Calculated combination results based on Fraunhofer ISE Report EEB3-HRW-1812-E18

This is a gtot graph with MicroLouvre KoolShade® (externally fitted) in combination with different EN reference glazing types at sun elevations 0° - 90°.

Computer models tend to use solar shading performance data and apply them to the reference glazing combinations from EN 14501.

This illustrates MicroLouvre KoolShade's performance in combination with different glazing types and how it can stop up to 100% of the solar heat gain. MicroLouvre KoolShade® can improve the performance of any glazing type. When combined on the exterior, or even in between double and triple pane glazing systems, the performance is rivalled by none.

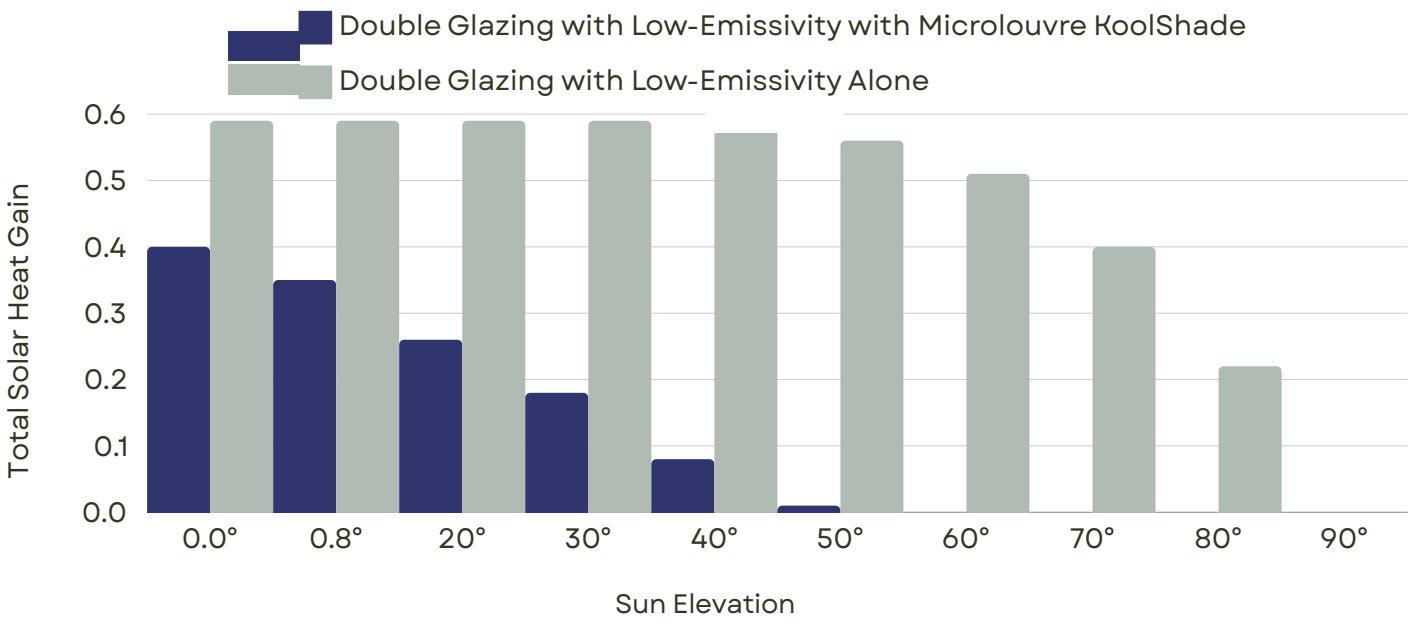
gtot: The measure of the total energy transmittance of the glazing in combination with the blind or shading device when exposed to solar radiation. Also known as the Solar Factor.

Modern buildings are typically designed with a heavy focus on preventing heat loss for the cooler months and less on preventing window solar gains.

New low-e glazing systems are very thermally efficient that help with this strategy.

However, during the warmer summer months once the glazing is exposed to the sun and solar heat gain enters the building, it creates a greater risk of overheating.

External shading is critical for this type of glazing system.



This graph illustrates MicroLouvre KoolShade's performance in combination with a low-e (C) glazing system and how it can stop up to 100% of the solar heat gain during the warmer summer months, significantly reducing the overheating risk.

KOOLSHADE®
WITH GLASS

gtot with MicroLouvre KoolShade® installations > = 30mm Open Airspace

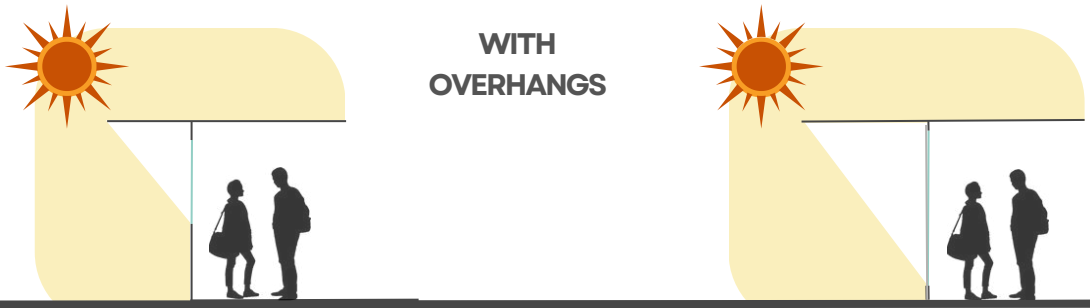
					g-value	effective g-value with KoolShade®								
Standard	**EN Ref**	**Glazing/Glazing Combination**		**U-Value**	**0°**	**8°**	**20°**	**30°**	**40°**	**50°**	**60°**	**70°**	**80°**	**90°**
EN 14501	A	Clear single glazing with KoolShade®	gtot ($g^{\perp}$)	5.8	*0.58*	*0.5*	*0.38*	*0.27*	*0.11*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*
		Clear single glazing alone	G-Value		0.85	0.85	0.85	0.84	0.84	0.82	0.76	0.63	0.39	0.00
EN 14501	B	Clear double glazing with KoolShade®	gtot ($g^{\perp}$)	2.9	*0.52*	*0.45*	*0.34*	*0.24*	*0.1*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*
		Clear double glazing alone	G-Value		0.76	0.76	0.76	0.75	0.75	0.72	0.67	0.53	0.3	0.00
EN 14501	C	Double glazing with low emissivity with KoolShade®	gtot ($g^{\perp}$)	1.2	*0.4*	*0.35*	*0.26*	*0.18*	*0.08*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*
		Double glazing with low emissivity alone	G-Value		0.59	0.59	0.59	0.59	0.58	0.56	0.51	0.4	0.22	0.00
EN 14501	D	Solar control double glazing with KoolShade®	gtot ($g^{\perp}$)	1.1	*0.22*	*0.19*	*0.14*	*0.1*	*0.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
		Solar control double glazing alone	G-Value		0.32	0.32	0.32	0.32	0.31	0.29	0.26	0.2	0.11	0.00
EN 14501	E	Triple glazing with KoolShade®	gtot ($g^{\perp}$)	0.8	*0.37*	*0.033*	*0.24*	*0.17*	*0.07*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*
		Triple glazing alone	G-Value		0.55	0.55	0.55	0.55	0.54	0.52	0.46	0.35	0.18	0.00

MicroLouvre KoolShade® angular dependent with glazing types

SHADING COMPARISON

To achieve 100% shading during hottest sun exposure a 1450mm high window it must have a 1600mm overhang.

To achieve 100% shading during hottest sun exposure a 2400mm high window it must have a 2430mm overhang.



WITH OVERHANGS

Direct sunbeam radiation through unprotected standard double glazing can heat horizontal surface temperatures to over **50°C**.

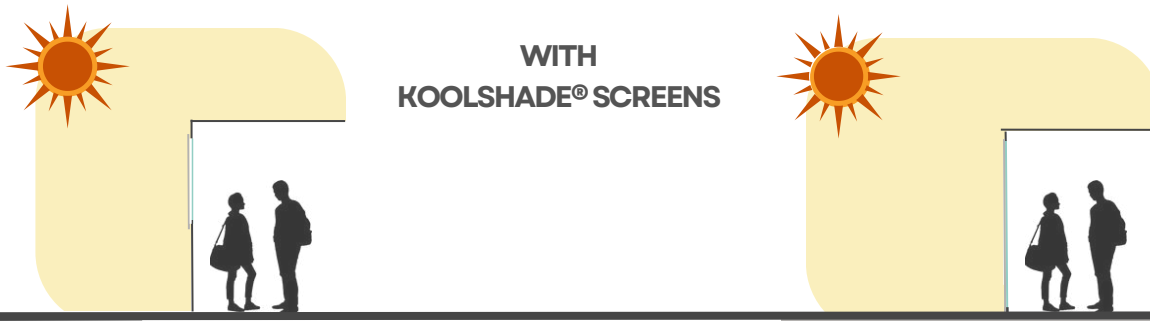
This includes those inside working near a window, causing unnecessary heat stress and risk to their health.

MicroLouvre KoolShade's utilises solar ground reflection more effectively than overhangs.

This helps the architect to design more efficient usage of the space.

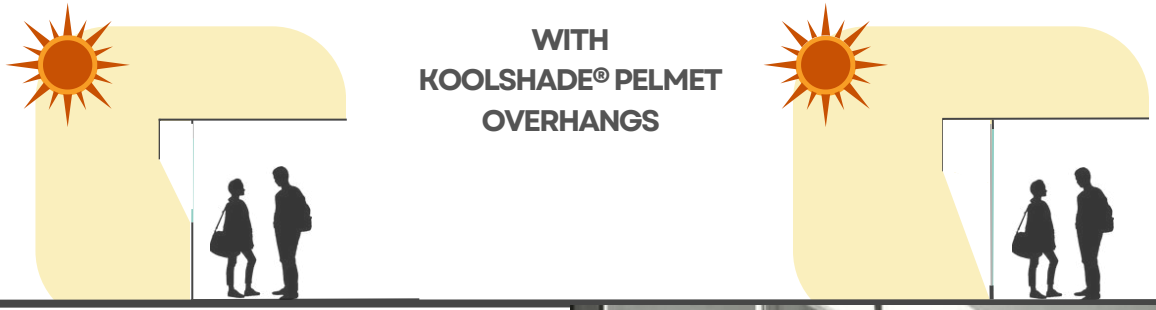
To achieve 100% shading during hottest sun exposure a 1450mm high window with KoolShade replaces overhangs.

To achieve 100% shading during hottest sun exposure a 2400mm high window with KoolShade replaces overhangs.



WITH KOOLSHADE® SCREENS

Having a KoolShade® Pelmet is a way to enjoy full shading from the sun whilst having the Solar Shading away from the glazing in an architecturally aesthetic way.



WITH KOOLSHADE® PELMET OVERHANGS

This direct sunbeam radiation proportional to the window opening will prevent workers operating safely in the space near windows.

For example; a single window opening of 1.2m wide by 1.5m high will cast an area of direct hot sunbeam of 1m2 (10.8ft2) at noon on peak summer to 3m2 (32ft2) at noon near both equinox.

Overhangs have been creating cool spaces for decades, as seen here in an image from 1962.

The offset arrangement means the buildings are shaded all year round.

CONTACT WITH THE OUTSIDE

With KoolShade®. Stop the heat, not the light & not the view.

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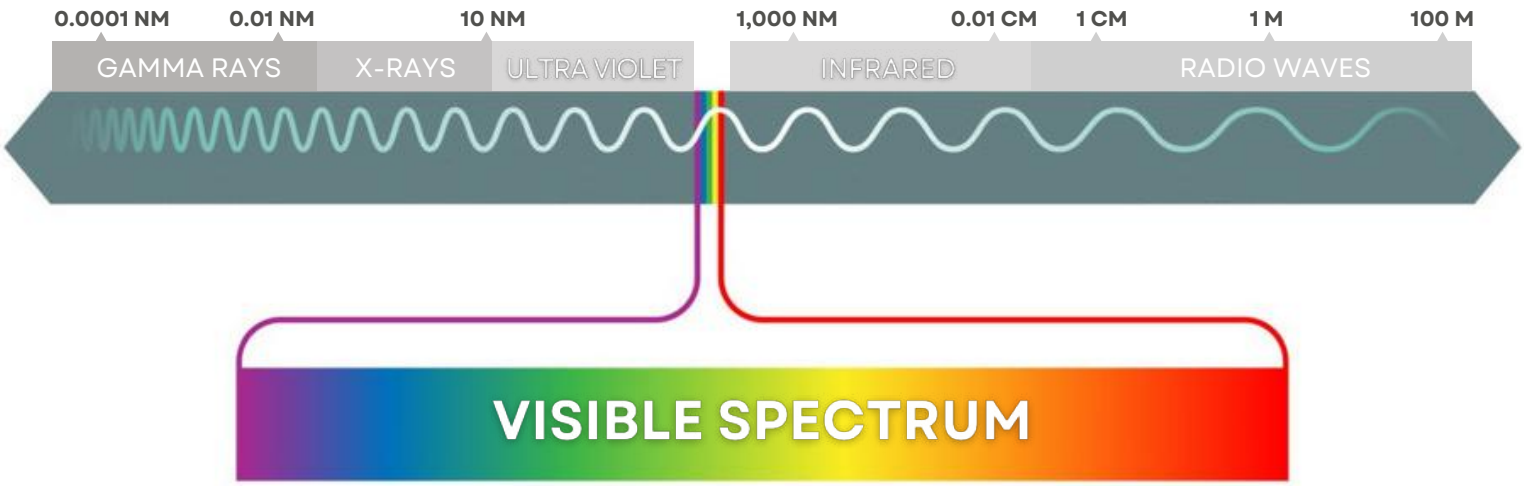
VISIBLE SPECTRUM

The amount of light is important, but the spectral composition of the light is also important. MicroLouvre KoolShade® releases the entire spectrum of light – **100% CRI (Colour Rendering Index) pure natural daylight.***



*Based on our standard black fabric finish.

SUSTAINABILITY

Increasingly essential with ever growing global temperatures.

MicroLouvre KoolShade® embraces all the principles with a fabric made from over 90% recycled scrap copper waste, with a proven life span and durability of 60+ years and 100% recyclability.

Reducing air conditioning costs by 68% and original equipment, whilst costing a fraction of traditional dynamic shadingsystem which has limited life spans and recyclability.

Air conditioning is hugely expensive, and proven to be very detrimental to the environment in both its manufacture and use of electricity to run.

Air Conditioning is the Biggest Global Factor in Growing Electricity Demand

Global electricity demand growth from 2018 to 2050, by energy use category

- 37.0% Space Cooling
- 25.5% Residential Appliances
- 12.4% Heating
- 7.8% Lighting
- 17.4% Other Services

Source: IEA

Campus Pictet De Rochement in Geneva. With MicroLouvre KoolShade® completely enveloping it, it will become the most sustainable building in Europe when completed in 2025.

Introducing air conditioning and comfort cooling is a typical way to control overheating. Cooled floor space area is increasing by 6.5%
annually in the UK.

This can substantially increase a building's energy consumption. A BRE case study estimated that installing air conditioning in a typical open-plan office would require an extra 55 kWh/m2/year, resulting in overall air-conditioning running costs of £15/m2/year.

KEY ADVANTAGES

The list of advantages from using MicroLouvre KoolShade® is long. A few of the most relevant are below alongside images of MicroLouvre KoolShade® installations from around the world.

- Improved building appearance.
- Maximum shading for mid-high sun angles.

- Designed to provide protection from the sun.
- Providing optimum contact with the outside.

- Minimising the need for artificial lighting.
- Ensuring occupier comfort

KEY BENEFITS

KoolShade®:

- Lowers fossil-fuel consumption
- Reduces Green House Gas Emissions
- Reduce the need for Air-Con by over 68%

- Allows a virtually unobstructed view to the exterior.
- Winter - time energy costs will be reduced by a minimum of 15%.

- MicroLouvre KoolShade® will cut out up to 100% of glare.
- And has a gtot as low as 0.0 (no solar transmittance)

- It is maintenance free. It has no moving parts.

- And helps avoid bird collisions.

ACCREDITATIONS

Fraunhofer

The Fraunhofer Institute for Solar Energy Systems ISE, with a staff of 1200, is the largest solar research institute in Europe.

When tested at Fraunhofer, the angle selective MicroLouvre achieved impressive results confirming MicroLouvre as the most comprehensive solution for Thermal and Visual Comfort in one system.

SIMSCALE

SimScale have specifically modelled & evaluated the thermal and pressure flow characteristics of MicroLouvre® and simulated the fabric in their digital wind tunnel set up at various wind speeds and angles. KoolShade therefore offers exact, detailed and specific NOT Generic data.

The results have allowed us to validate previous performance data and determine an appropriate discharge coefficient (Cd) which can be inputted directly into thermal modelling software such as IES, TaS and DesignBuilder.

BERKELEY LAB

The Lawrence Berkeley National Laboratory California included MicroLouvre in a major research project for one of America's largest Energy companies. With MicroLouvre, daily cooling loads were reduced by 68% on sunny days when compared with dual pane, high performance solar control glass with an internal blind.

bre

Building Research Establishment (BRE) the world's leading building science centre, wind tunnel tested MicroLouvre screens from different angles to simulate severe wind conditions on high buildings.

MicroLouvre proved to be indestructible at winds exceeding 100mph+, in excess of Hurricane Force 12 on the Beaufort Scale and a Category 2 Hurricane on the Saffir-Simpson scale.

IFC GROUP

Recognised internationally as the go-to professionals in all aspects of fire safety. We are very proud to be working with one of the world's leading fire engineering and solution providers, trusted by many of the most prestigious construction firms, architects and estate owners.

bsi. ISO 9001 Quality Management

ISO 9001 is defined as the international standard that specifies requirements for a quality management system (QMS). Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements.

Smartlouvre Technology

Manufacturer of
MicroLouvre KoolShade® fabric
A unique remedy to the challenges of
solar climate change on our habitat.

SLTechnology Ltd. Global Manufacturers of MicroLouvre KoolShade® Fabric
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