

OKASOLAR 3D

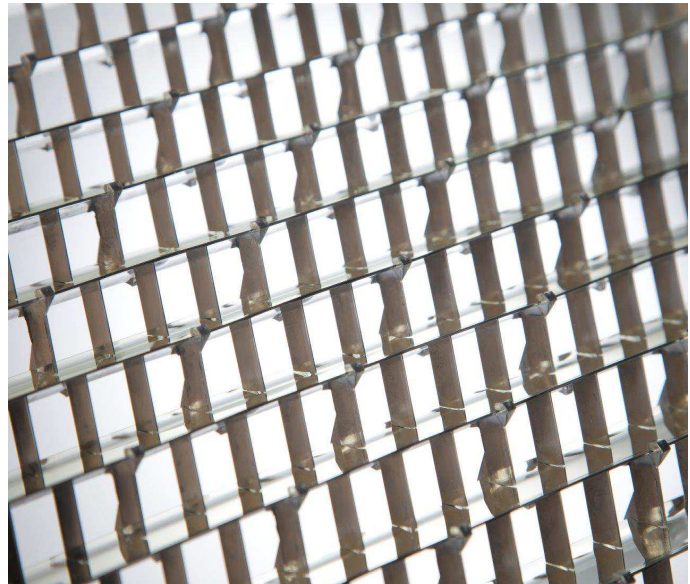
Insulating glass with three-dimensional sun protection grid

OKASOLAR 3D is an insulated glazing system with a three-dimensional, highly reflective sun protection grid in the cavity between the glass panes. The geometry of the sun protection grid has been optimised for roof applications. The direct solar transmission is blocked at all times, irrespective of the height of the sun. This effectively reduces the heat gain into the interior of the building. At the same time a large proportion of diffuse daylight from the northern hemisphere gets into the interior. This results in even light distribution in the interior and significantly less fluctuation in brightness than with direct sunlight.

As façade glazing we recommend our products OKASOLAR W and OKASOLAR F.

Thanks to its three-dimensional, highly reflective sun protection grid, OKASOLAR 3D offers:

- Effective solar control
- Reduced heat gain
- No direct solar transmission
- Reduced glare
- Use of diffuse daylight
- Partial through-vision to the north
- Perceptible link to the exterior due to sun reflections
- Maintenance and fault-free
- Can be easily recycled
- Visibility for birds



Physical properties

Thermal insulation

OKASOLAR 3D is available as a 2-pane make-up with a space between the panes of 24 mm, and also as a 3-pane make-up with an additional cavity between the panes.

Depending on the gas filling and coating, the 2-pane make-up achieves U_g values ≥ 1.4 W/(m²K). As a 3-pane make-up, U_g values ≥ 0.7 W/(m²K) are possible.

Sound insulation

The integrated louvres have no significant effect on the sound insulation. The achievable values depend on the glass assembly.

Spectral properties

The way OKASOLAR 3D works depends on the relevant light conditions and it is manufactured to suit the geographical location, inclination and orientation of the roof in question. OKASOLAR 3D is usually installed so that the main louvre runs from east to west. Together with the regularly spaced cross bars, the louvres provide complete shading from direct sunlight, leading to a reduction of the solar heat gain with an average g-value of approx. 10 % in the lock-out area.

The main louvre is made of aluminium with a reflection (solar and visual) of 90 %. The cross bars are concave in shape, so also at low solar altitude, the sunlight is always reflected to the outside. They are made of plastic with a highly reflective surface with a reflection (solar and visual) of over 80 %.

The sun protection grid, which is open to the north, enables partial transparency and allows diffuse irradiation. The thin cross section of the louvres enables a transparency of the grid itself of up to 85 %, depending on the direction of sight, and a diffuse light transmission of 60-70 % in the area of transmission.

In roof applications, OKASOLAR 3D functions as follows:

1. Lock-out area (general direction: south)
 - Thermal sun protection with g-values of 7 % or more, particular secondary heat dissipation without solar radiation transmission
 - Reduced glare
2. Area of transmission (general direction: north)
 - diffused irradiation of daylight
 - partial through-vision

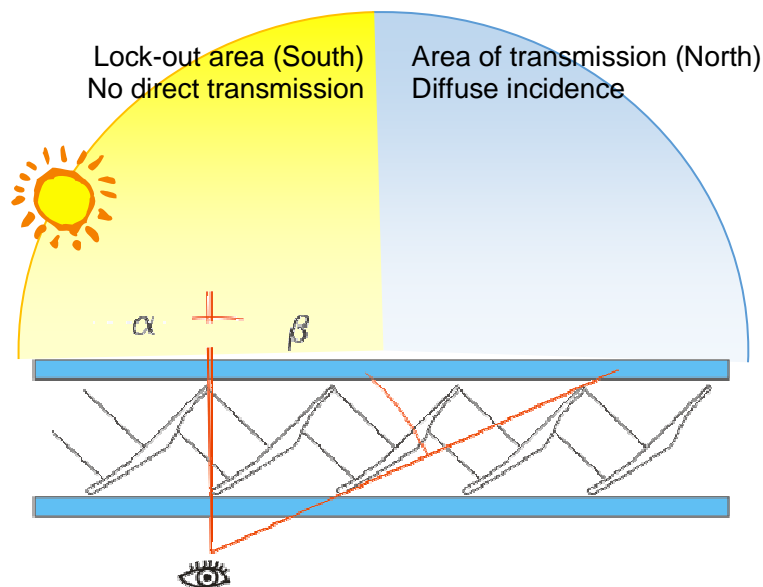


Table 1: Geometry of the different OKASOLAR 3D types

Type	Angle of louvre [°]	Distance of louvre [mm]	Maximal through-vision %	Trough-vision	
				from α [°]	to β [°]
3D 44/23	44	23	85	3	-66

Technical values of standard types

The following information applies to 2-pane make-up consisting of a 6 mm external pane and an 8 mm inner pane laminated safety glass with a thermal control coating at face #3.

Table 2: Technical values for the 2-pane make-up with low-e coating

Type OKASOLAR	T _v direct %			T _v dif- fuse %	TSET %			U _g value [W/(m ² K)] / U _g [Btu/(hr ft ² °F)] cavity 24 mm		
	Lock- out area	Area of transmis- sion	Verti- cal		Lock- out area	Aver- age Lock-o. area	Verti- cal	Krypton	Argon	Air
3D 44/23	4-8	70	20	27	8-19	10	37	1.4 / 0.25	1.6 / 0.28	2.0 / 0.35

The following information applies to 3-pane make-up consisting of a 6 mm external pane, a 6 mm middle pane and a thermal control coating at face #3 and an 8 mm inner pane laminated safety glass with a thermal control coating at face #5.

Table 3: Technical figures for a 3-pane make-up with low-e coating

Type OKASOLAR	T _v direct %			T _v dif- fuse %	TSET %			U _g value [W/(m ² K)] / U _g [Btu/(hr ft ² °F)] cavity 24 mm / 12 mm		
	Lock- out area	Area of transmis- sion	Verti- cal		Lock- out area	Aver- age Lock-o. area	Verti- cal	Krypton	Argon	Air
3D 44/23	4-7	60	20	23	7-14	10	23	0.7 / 0.12	0.8 / 0.14	1.1 / 0.19

Legend and related values:

	unit	standard	technical term
U_g	W/(m ² K)	DIN EN 673 DIN EN 674	Thermal transmittance
TSET	%	DIN EN 410	Total solar energy transmittance or solar heat gain coefficient
T_v	%	DIN EN 410	Light transmission (direct/hemispheric resp. diffuse/ hemispheric)
R_w	dB	DIN EN 20140	Sound reduction coefficient
F_c	%	DIN 4108	Reduction factor of a solar control system, F _c =TSET/TSET _{reference}
SC	%	GANA Manual	Shading coefficient, SC=TSET/0.86

The above data are approximate data. They are based on measurements of approved test institutes and calculations derived from these measurements. Values determined on a project-specific basis may vary from the above values. The values continue to vary if other coatings are used.

Direct transmission relates to direct incidence of light, generally vertical (model situation for direct sun-light). Diffuse transmission applies to homogeneous, diffuse incidence of light from the outer hemisphere (model situation for an overcast sky). All values were measured hemispherically.

The specified values may change as a result of technical developments. No guarantee is therefore given for their correctness.

Make-up

The special feature of OKASOLAR 3D is that the sun protection grid is integrated into the cavity of the insulated glazing system, so there are special requirements with regard to installation, maintenance or repair, and the entire system can be treated just like standard insulated glazing. The thickness and type of glass depend on structural and building requirements. However, for structural reasons the bending radius is to be limited to 12 m under deformation. For that reason we recommend the minimum thicknesses according to table 4 for the deformation of various types of glass.

Table 4: Minimum glass thicknesses when using float, Heat Strengthened Glass, Tempered Glass and Laminated Safety Glass

Minimum glass thicknesses	Annealed Float	Heat Strengthened Glass	Tempered Glass
Monolithic	3 mm	4 mm	6 mm
Each individual pane of LSG	3 mm	4 mm	6 mm

Standard make-up:

2-pane make-up

Outer pane made of thermally treated glass with surrounding screen-print at face #2

Cavity: 24 mm with integrated sun protection grid and gas filling

Inner pane: LSG made of float glass or Heat Strengthened Glass with low-e coating at face #3

3-pane make-up

Outer pane made of thermally treated glass with surrounding screen-print at face #2

Cavity 1: 24 mm with integrated sun protection grid and gas filling

Middle pane made of float glass or thermally treated glass with low-e coating at face #3

Cavity 2: 8 to 12 mm with gas filling

Inner pane: LSG made of float glass or Heat Strengthened Glass with low-e coating at face #5

Dimensions

The table below show maximum dimensions and visible widths.

glass dimension parallel to main louvre axis	max. 3000 mm
glass dimension perpendicular to main louvre axis	max. 3000 mm

The maximum area is 7 m². Special shapes are possible. It may be necessary to use an increased secondary sealant in the case of smaller dimensions and/or greater thickness of glass.

Pressure on the surface of the pane can permanently damage the louvre insert. Even when of the appropriate dimensions, the panes must not be walked on without the agreement of the manufacturer. When planks are laid over the window, the load must be carried over the edge of the pane.

For tolerance reason and due to different thermal expansions, the insert may exhibit a visible light gap between the insert and the spacer bar. For this reason, the overall sealant (spacer bar + secondary seal) plus additional 33 mm have to be covered by a profile or by an appropriate edge screen printing.

In the case of a polysulphide as secondary seal, it may be necessary to use a exceed cover in order to provide sufficient UV protection. In the case of a frameless glazing system, it is generally recommended that the edge areas are covered using a UV-impenetrable edge enamelling. Depending on loading, the required sealant width can be considerably greater than that of "conventional" insulating glazing.

Planning instructions

On the basis of the planning data, in particular

- geographical latitude of the project
- roof orientation
- roof inclination
- room utilisation

we develop a project-specific *OKASOLAR* assessment. The shading times of the respective *OKASOLAR* type are evident in the *OKASOLAR* assessment.

In the case of *OKASOLAR*, as a result of the back reflection of the light on the outer glass surfaces, an additional internal glare protection may be necessary in particularly critical applications (e.g. computer workstations). The reflections of the sun create a perceptible link to the exterior.

The louvres have a highly reflective coating, which contributes to an effective redirection of solar radiation. For this reason, certain lighting conditions and viewing angles may already make slight deviations in the positions of some of the louvres or cross bars visible. These deviations are unavoidable and do not affect the function of the insulating glass.

If the *OKASOLAR* insulating glazing is being installed at temperatures $< 0^{\circ}\text{C}$ in an unheated building (winter construction site), we must be notified of this in writing beforehand.

Installation instructions

OKASOLAR insulating glass is glazed as per normal insulating glass. During transportation, the insert may slide to the side, creating a greater visible slit between the spacer. We must be notified in writing beforehand of any special loads which may occur during transportation (vibrations/shaking).

For instructions and recommendations for the installation of our insulating glazing, please refer to our information and instructions for customers contained in "Delivery of *OKALUX* Glass Products" and "General Information on Glazing".

Other printed matter

If you do not have the following printed matter, please request it directly from OKALUX or down-load it from the Internet at www.okalux.com:

General terms and conditions of business
Product-specific information texts

As well as these, there are the following customer notes:

Customer notes on offers
Customer notes on delivery
Customer notes alarm glass
Customer notes screen printing
Customer notes Structural Glazing / Edge deletion
Customer notes on heat-soak test
Customer notes on glazing
Customer notes SIGNAPUR®
Customer notes OKAWOOD tolerances
Cleaning instructions for OKALUX gen.
Cleaning instructions OKACOLOR
Guideline for visual quality