

OKAGEL light-diffusing high-performance insulating glass

OKAGEL provides thermal insulation in an unsurpassed quality. By using a light-diffusing silica aerogel in the cavity between the glass panes, OKAGEL enables

- best possible even light distribution into the room, independent of changing irradiation conditions together with glare protection
- project-specific light transmission and total solar transmittance
- excellent thermal insulation
- outstanding sound attenuation
- UV control according to requirements
- appealing appearance of insulating glass in daylight or artificial light
- effect of depth when viewed from inside and outside
- visibility for birds



Physical properties

Thermal insulation

The high grade thermal-insulating aerogel has an air content of around 97% and weighs just 75g per litre. Therefore, it is currently the lightest solid material and the best insulation material worldwide. The aerogel filling reduces the thermal transition in the space between the panes with regard to convection, thermal conduction and thermal radiation.

The microstructure of the aerogel is made up of a three-dimensional grid with an average pore size of around 20 Nm. This encapsulates the existing gas molecules and their movement, and also prevents any impact between them. This effectively prevents the convection as well directly stopping the thermal conduction in the gas phase. Due to the low percentage of materials, the solid state thermal conduction in the aerogel is minimal.

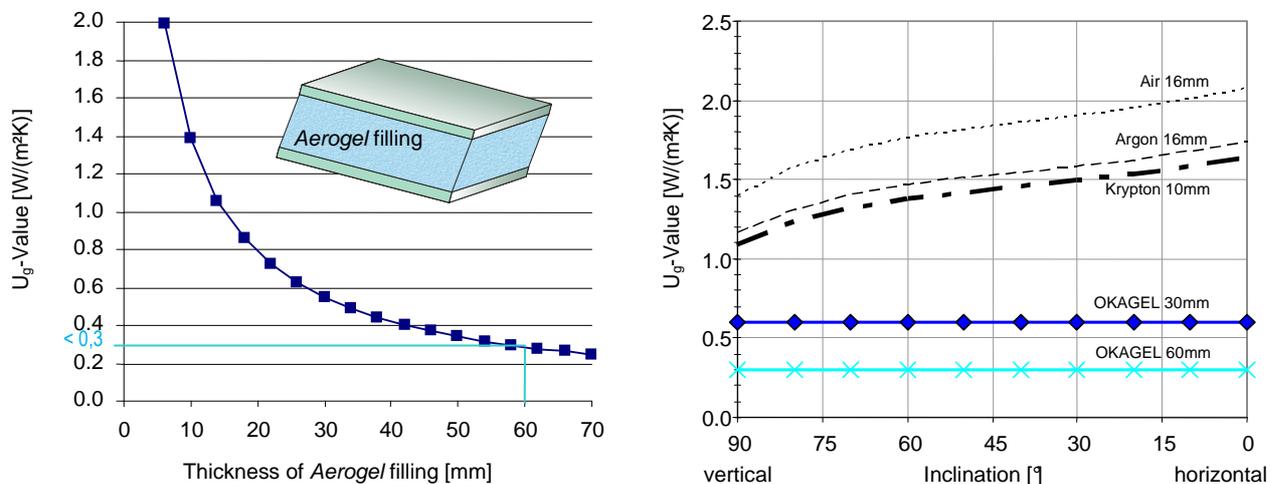


Figure 1: U-value OKAGEL depending on thickness and inclination angle.

The thicker the aerogel filling, the better the U_g value. OKAGEL is available as a 2-pane make-up with a cavity of 30 mm to 60 mm. Depending on the space between the panes, U_g values of between 0.3 and 0.6 $W/(m^2K)$ can be achieved.

The U_g value of an insulating glass as per DIN EN 673, and/or DIN EN 674, always refers to the vertical installation. If the insulating glass is inclined, e.g., in the case of a roof glazing, the U_g value rises, as the convection in the space between the panes increases. As horizontal roof glazing, insulating glass with the normal value $U_g = 1.1 W/(m^2K)$ has a real value of around 1.7 $W/(m^2K)$.

The aerogel filling in the cavity between the panes prevents the convection, therefore the U_g value of OKAGEL remains constant in every installation position.

Sound insulation

OKAGEL achieves a very high sound insulation value. The porous aerogel structure drastically reduces the speed of the spreading sound waves, resulting in excellent sound insulation properties. With a 30-mm cavity, OKAGEL achieves a sound insulation value of $R_w = 52$ dB.

Spectral properties

The special light diffusing properties of the aerogel filling provide an optimized, uniform distribution of light in the room, regardless of irradiation conditions. The g value and light transmission depend on the thickness of the aerogel filling. Other g values and light transmission values can be provided on request with the use of special make-ups.

Technical values of standard types

The following specifications apply to the 2-pane make-up with a 4 mm thick low iron outer pane and a 6 mm laminated low iron glass inner pane (0.76 PVB foil).

Type	T_v %	TSET %	SC %	U_g value [$W/(m^2K)$] / U_g [Btu/(hr ft ² F)]
OKAGEL 30 mm	≤ 59	≤ 61	≤ 71	0.6 / 0.11
OKAGEL 60 mm	≤ 45	≤ 54	≤ 63	0.3 / 0.05

Legend and related values:

	unit	standard	technical term
U_g	$W/(m^2K)$	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. Lower g values can be achieved by combining selective solar protection coatings.

Direct transmission relates to direct incidence of light, generally vertical (model situation for direct sunlight). Diffuse transmission applies to homogeneous, diffuse incidence of light from the outer hemisphere (model situation for an overcast sky).

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

Make-up

What makes OKAGEL light diffusing insulating glass so special is the cavity between the panes, types and thickness of glass according to structural requirement. For constructional reasons, we recommend using ESG-H as an external pane and VSG made of TVG as an inner pane.

Minor fluctuations in the density of the aerogel as well as production-related inhomogeneity may be recognisable.

Dimensions

Dimensions min.: 500 mm x 500 mm

Dimensions max.: 2.000 mm x 3.000 mm

Special dimensions upon request.

Due to tolerance justification and different thermal expansions factors the filling may be provided with an expansion gap of 1 % of the component height. Therefore a gap may become visible between the filling and the spacer bar. For this reason the glazing channel in the rebate must be at least 1 % of the component height or be covered using an edge screen. If the edge sealant is increased, a larger cover may be necessary.

In the case of a polysulfide 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 screen print. Depending on loading, the required sealant width can be considerably greater than that of "conventional" insulating glazing.

Planning instructions

Builder-owners and architects must be able to technically assess the effect of glazing in daylight terms. Okalux offers such calculations as a voluntary extra service without obligation. The daylight-relevant properties of the room to be examined must be known; in particular, these are:

- room geometry, window dimensions
- approximate degree of reflection of the surfaces forming the room boundaries

The so-called daylight coefficient (D) in accordance with DIN 5034, Part 3, is relevant for the evaluation of the ambient daylight. This gives the ratio between the horizontal luminous intensity indoors and out of doors, under a completely overcast sky. This value can be calculated for different glazing variants using the existing simulation tools. The customer can thus assess the light-directing effects of special products, in comparison with normal glazing as well. In addition to the assessment in accordance with DIN, virtual images can visualise the light distribution in the rooms.

Installation instructions

OKAGEL insulating glass is used for glazing like normal insulating glass. However, it must be ensured that the pressure equalization tubes, which are required for the continuous ventilation, can work flawlessly. If necessary, the location and installation of the pressure equalization tubes must be coordinated with us beforehand. As standard, the pressure equalization tubes are oppositely legated at two diagonal corners.

If a suction lifter is used for installation it is important to remove the suction lifter carefully and without shock. Pulling of the suction lifter jerkily can cause settlement of the aerogel granule.

Settlement of <1% can occur during transportation. 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 printer matter, please request it directly from OKALUX or download 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 installation of OKAFLEX

Customer notes installation of OKAPANE

Customer notes OKAWOOD tolerances

Customer notes OKACELL product specification

Cleaning instructions for OKALUX gen.

Cleaning instructions OKACOLOR

Guideline for visual quality