

Building Physics

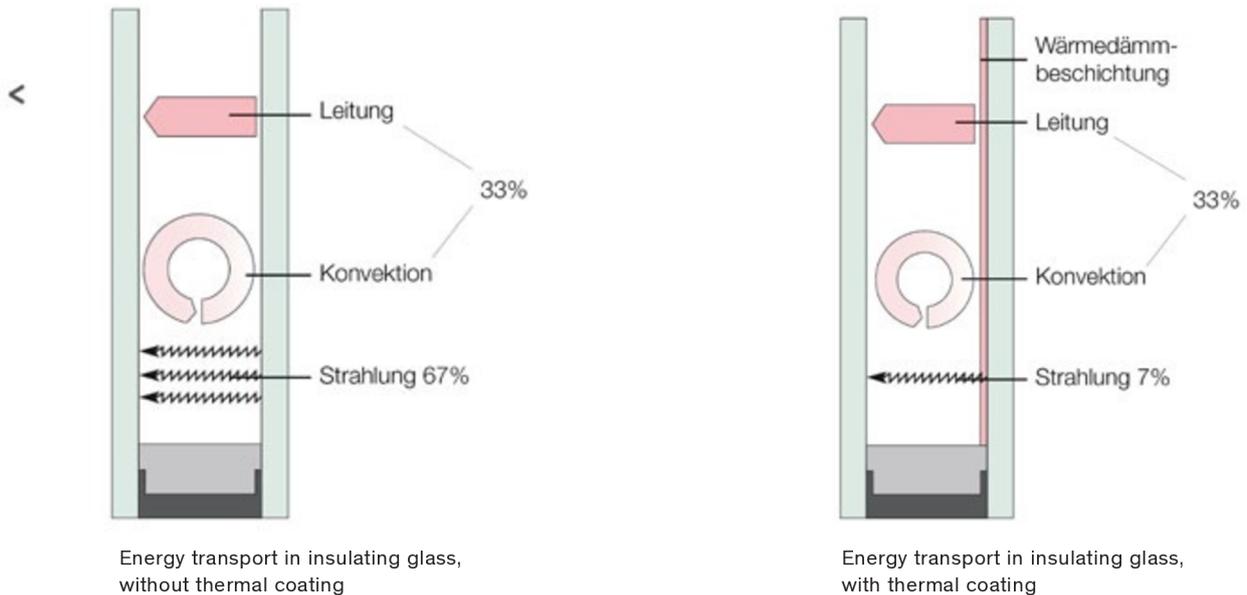
The building physics requirements for structures are largely determined by the properties of their components. air-lux combines patented profile technology, multiple glazing systems and the patented pneumatic sealing system to achieve outstanding thermal insulation. The result is large sliding glass units with high energy efficiency and excellent user comfort.



The Minergie standard or higher represents the state of the art at air-lux. Large sliding glass units are highly thermally insulating components. They meet ecological and economic requirements alike.

Glazing

U-Value, thermal transmittance



The U-value (thermal transmittance coefficient, W/m^2K) describes the heat loss through a building component. It indicates how much energy per unit of time passes through $1 m^2$ of material when the air temperatures inside and outside differ. The lower the U-value, the better the thermal insulation.

Principle of Insulating Glass

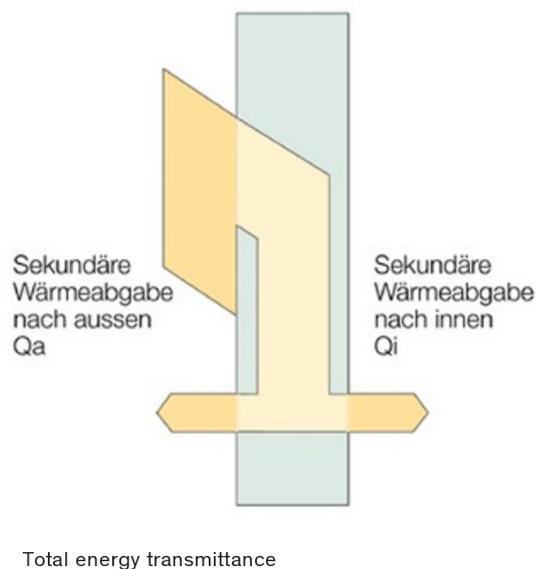
Heat is transferred from the indoor air to the inner pane. Energy exchange takes place primarily through long-wave infrared radiation. Additionally, heat conduction and, to a lesser extent, convection occur within the cavity between panes. Energy is thus transported to the outer pane and released to the outside air.

Functional coatings in insulating glass

Functional coatings in insulating glass enhance the overall performance of the component:

- Reduction of energy costs thanks to higher thermal insulation (U-value)
- High light transmission for bright rooms (t_v in %)
- Optimised use of solar energy through solar control coatings (g-value)
- Combinable with different U- and g-values depending on climate concept
- Can be combined with safety functions and sound insulation solutions
- Suitable for passive and low-energy houses

g-value, Solar Heat Gain

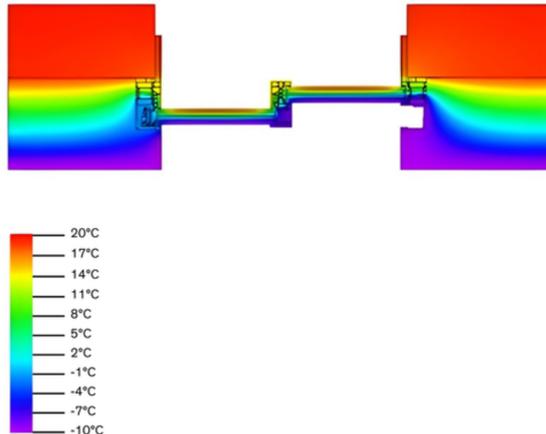


Total energy transmittance

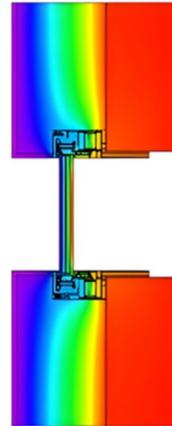
The g-value (in percent) indicates how much incident solar radiation enters the interior. It consists of total energy transmittance (τ_e in %) and secondary heat emission. Secondary heat emission occurs because the glass warms up due to sunlight and releases heat to both the inside and outside. The higher the g-value, the greater the solar gains transmitted into the interior.

Thermal Separation in the air-lux Window System

Temperature profile:
Horizontal section
 Boundary conditions
 Outside -10°C
 Inside +20°C



Temperature profile:
Vertical section
 Boundary conditions
 Outside -10°C
 Inside +20°C



Isotherms, interior temperature 20°C, exterior temperature -10°C

Avoid thermal bridges

Avoiding thermal bridges is essential in large glazing and façade constructions in order to achieve the planned insulation performance. Proper execution reduces risks such as condensation, mould, comfort losses, reduced insulation performance and structural damage.

air-lux achieves thermal separation through a multi-shell system design:

- Frame profiles with inner and outer aluminium profiles
- Centre profile made of special synthetic material as an insulator
- Sliding leaf profiles made of multiple aluminium and synthetic profiles, partially force-fitted

In combination with insulating glass with low U-values, a highly thermally insulated edge bonding system and the patented pneumatic sealing system, very low U-values exceeding the Minergie standard are possible.

Resistance to wind load (EN 12210) up to class C4 / B4

Static and dynamic wind loads test the effects of wind forces on element deformation. Permanent deformation leads to functional disadvantages. air-lux achieves very high values. Sliding sashes are designed for maximum loads. Precise profile dimensioning is decisive, aiming for a balanced combination of aesthetics and function.

Air permeability (EN 12207) up to class 4

Air permeability is a key parameter for comfort and energy efficiency. It is determined by suction and pressure effects. Leakage results in noticeable comfort losses and energy losses. Thanks to its patented air sealing principle, air-lux achieves the highest airtightness values.

Driving rain tightness (EN 12208) up to class E1500

Driving rain occurs when wind deflects rain from its vertical direction. Water can therefore also impact vertical surfaces. Driving rain tightness describes the system's ability to prevent water penetration under pressure in closed and locked condition. air-lux achieves top values up to E1500, even for sliding units up to 18 m². This performance is particularly relevant for exposed locations and demanding orientations such as lakes, seas, mountains or high-rise buildings.

Sound insulation (DIN EN ISO 10 140-2)

Sound insulation is based on reducing airborne sound energy, for example external noise. In window construction this can be influenced by special insulating glass, for example through higher glass mass, asymmetric structures or sound protection films in composite panes. For the overall effect, not only the glass is decisive but also the frame, fittings, sealing and the connection to the building structure. For the finished façade construction made of frame and glass, air-lux achieves sound insulation values of up to 43 dB.