

## Is it problematic if the window is better than the wall?

### Mould growth due to window replacement?

It is often said that the thermal quality of windows should not be better than that of the surrounding walls because otherwise this would lead to mould formation. Some financing programs even require a lower quality window than the wall. This requirement is counterproductive from both the economic and ecological perspective.

This fact sheet is intended to encourage a better understanding of the coherences and thus provide a basis for making the right decision.

The U-value of an existing exterior wall in a non-renovated state is approx.  $1.4 \text{ W}/(\text{m}^2\text{K})$ , therefore the U-value of a new triple-glazed Passive House window with a high-quality frame (maximum U-value  $0.8 \text{ W}/(\text{m}^2\text{K})$ ) will inevitably be better than the U-value of the wall.

In addition, the window is optimised to the extent that the coldest point is no longer in the area of the window and is instead found in the area of the non-renovated wall. In the context of the Component Award 2015, PHI provided evidence of this for all calculated cases.

The question that now arises is, whether this circumstance results in increased problems relating to hygiene (i.e. mould formation).

As a rule, old windows are not airtight.

Uncontrolled air exchange therefore occurs through these windows, contributing to impairment of thermal comfort and considerable loss of energy (as well as avoidable heating costs). However, this lack of airtightness also ensures the removal of humidity and indoor air therefore remains relatively dry.

If the old, leaky windows are now replaced with new airtight windows, this can lead to substantial hygiene-related problems:

The reduced air exchange through the now airtight windows requires more frequent airing by the user for removing the humidity that arises in the room. Users often do not adapt their behaviour to the new situation with reference to airing, and indoor air humidity increases as a result of this, leading to problematic conditions relating to hygiene. Condensation may even occur at the coldest points of the room.

These problems result from the lower rate of air exchange and are not due to the thermal quality of the windows. For this reason, a ventilation concept must also be provided together with the renewal of the windows, or attention should at least be drawn to this problem. Increasing ventilation by cutting up the seals or using window-integrated ventilation systems without heat recovery or regulation will solve this problem only to a limited extent and will lead to high heat losses.

A ventilation system with heat recovery solves this problem reliably and provides better indoor air quality with low energy costs.

### Conclusion:

It is not the thermal quality of the windows which leads to potential problems due to increased humidity levels after windows have been replaced, but rather their higher level of airtightness; this results in reduced air exchange, leading to an increase in the indoor air humidity.

The solution to this problem lies in improved ventilation, preferably with heat recovery.

Dr. Benjamin Krick | Passive House Institute

©IG-Passivhaus / Passivhaus Institut

Further information and sources

[www.passipedia.org](http://www.passipedia.org)

Feist, Wolfgang (Editor): Schimmel durch Fenstererneuerung? EnerPHit Planerhandbuch S.317 f., PHI Darmstadt 2012

Krick, Benjamin: Passive House Windows: Comfortable, profitable, innovative and futureproof COMPONENT AWARD. In:

Feist, Wolfgang (Editor): Conference Proceedings 19th International Passive House Conference 2015 in Leipzig, PHI Darmstadt 2015