



Thermal bridge effect of plastic anchors in external thermal insulation composite systems (ETICS), with reduced thermal conductivity of the insulating material

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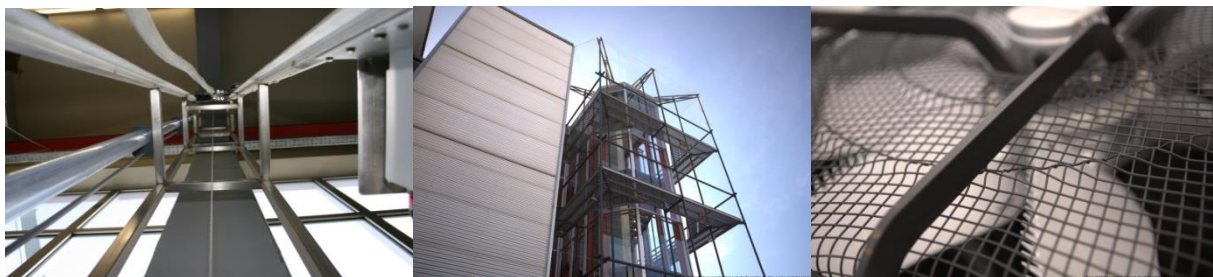
Summary

The securing of an external thermal insulation composite system (ETICS) generally takes place by means of anchoring using plastic anchors. The individual anchors thereby constitute point thermal bridges and can result in an increase in the thermal transmittance coefficient of an insulated exterior wall. However, according to DIN EN ISO 6946, an increase in the thermal transmittance coefficient, also known as the U-value, of up to three per cent is acceptable and does not require correction. Strictly speaking, the three per cent limit applies to the sum total of the influences and not only to the influence exerted by the fixings, whereby, in the instance of a professionally assembled ETICS, it may be assumed that the influence exerted by the air gap (between the ETICS and the supporting surface), also stated in the standard, does not feature.

This body of research examines the maximum number of anchors that can be used to secure an ETICS to the substrate, without these having to be factored into the U-value of the structure. The maximum number of anchors is thereby contingent upon the thickness and conductivity of the ETICS. The thicker the ETICS and the lower its thermal conductivity, the stronger the influence exerted by the anchors on the U-value of the insulated exterior wall. This means that as the heat transfer resistance of the insulation rises, there is a decline in the maximum number of anchors permitted that still does not entail a correction of the U-value. Ultimately, the anchor itself exerts a major influence on whether a correction of the U-value must occur or not. For this reason, anchors used and developed nowadays exhibit a point thermal transmittance that is as low as possible. If the χ -value is smaller than 0.0005 W/K, the anchorage is deemed free of thermal bridges, and the anchor no longer needs to be taken into account.

Against this backdrop, tables have been compiled that facilitate a swift review of the maximum number of anchors. The tables are gradated according to varying thermal conductivities of the ETICS, and span the range from $\lambda = 0.040 \text{ W/(m}\cdot\text{K)}$ to $0.015 \text{ W/(m}\cdot\text{K)}$. The thickness of the ETICS in the tables is gradated from lower than 50 mm to higher than 250 mm.

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